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A High Adventure

"A HIGH adventure" was how Captain Donaldson, in his presidential address to the I.E.E., described the beginnings of the electricity supply industry, and a high adventure it certainly was judging from the reminiscences of those who played a part in those beginnings. The time needed men who combined in themselves, to use Mr. Llewelyn Atkinson's apt phrase, the strangely assorted qualities of the scientist, the engineer, the financier, and the pirate. If we suggest that the last may have been the first in importance, it is only because the revelations of our elders indicate that the others would often have been of little avail without it.

The achievements of these pioneers are not to be measured by the mere size of the plant they dealt with, but by the difficulties that such men as Ferranti and Crompton had to overcome. They had even to design plant before they could install and operate it, for there were in those days no staffs of specialists at large manufacturing works and research organisations steeped in fundamental theory that is, in its practical applications, based upon the more empirical methods of their forbears.

The fifty-year gap between Faraday's discovery in 1831, of the principle underlying the generation of electricity and the serious application of this principle to the public service is explained by the fact that the world still awaited "the sub-division of the electric light" and the production of suitable generating machinery, by Swan, Hopkinson, and the great American who passed away last week.

It might appear that everything was then in train for the rapid development of a promising young industry. It did not happen so; the chief reason was that a legislature, more concerned that improper advantage should not be taken of statutory powers than that any electricity should be supplied at all, passed in 1882 the first of its doubtless well-intended but restrictive Electric Lighting Acts. It seems strange to us now to recall that it was not until after the War—as a result of the impressive record of electricity during the War—that recognition was given in an Act of Parliament to the almost self-evident fact that the supply of electricity was something to be encouraged rather than obstructed, for, whatever the defects of recent legislation, the spirit behind it has been manifestly the very opposite of that which animated the framers of the earlier laws. It was this legislative obstacle, so gratuitously placed in their way, that made the task of those who laid the foundations of the supply industry so much harder, and forced them to become "pirates" in the public interest.

The historical survey in the presidential address is interesting in itself as a summary of past events that have given our industry its peculiar character. Captain Donaldson has also shown that a study of history is useful if only in order to prevent history repeating itself.

The Systematic Canvass

WHILE the need for a systematic canvass of the whole country by electricity supply authorities, urged in our leader last week, is still under discussion, it should not be forgotten that most electricity authorities have the matter entirely in their own hands—they can proceed with such an enterprise just when they wish to do so. And the fact that they possess the vital information throws the responsibility for action directly upon them. Their records show who is and who is not a consumer; they know what points are installed and what appliances are in service. Thus they are informed within a little what scope remains in any given premises or in any particular street. If they cannot for particular reasons do the work alone they can either unite with the local contractors or place the necessary information at their disposal, so that *they* can act with knowledge. There is no lack of candidates, both men and women, with sufficient technical and commercial training, for work on the selling side of electricity supply. What they need is opportunity and encouragement. It was for such a calling that men, displaced by the progress of the national scheme, were expected to be required; and large numbers of women have been qualifying for such service in recent years. Now should be the time for absorbing these in a national campaign.

Another Urgent Call

THE urgent call to electricity suppliers which was stressed in our last issue has quickly been followed by another. Both demand immediate and serious attention. Mr. Ll. B. Atkinson's talk to the sales and publicity managers made it clear that the Central Electricity Board was uneasy regarding the rate of growth of demand and the further utilisation of the grid circuits which have been erected at great expense. Two days later, Mr. Frank Hodges, who is a member of the Board, spoke with emphasis at Rugby of the urgency of intensive industrial electrification. Calculating that our industries are under-electrified to such a degree that more than 3,500,000 horse-power of electric motors can still be introduced, and that many industries are not equipped for meeting strong competition, he appealed to our great electrical manufacturing companies to have at their disposal extensive credit and finance organisations which could come to the assistance of basic industries weakened by prolonged depression, and make it possible for industrial electrification to be carried out on the widest possible scale. It is not enough, as Mr. Hodges says, to stand back and allow the demand to develop. We must give a definite incentive.

Oiling the Wheels

AMONG the evidences of trade revival is the placing of extensive orders for lubricating oil. Mr. E. S. Shrapnell-Smith, in a letter to the Press says that such orders are being received from all over the country and from all kinds of works. He interprets this as proof that the wheels of industry are turning or getting ready to turn, lubricants being now required to restart plant and machinery which has been idle for a couple of years. Electrical manufacturers, contractors and electrical suppliers will be alive to the promise of the changing situation.

The Australian Tariff

THE very serious decline of British electrical exports to Australia during the last two years, due to increasing rates of duty, and, in some cases, of absolute prohibition of certain imports, makes the Commonwealth Tariff Board's latest report of urgent interest to British electrical manufacturers. The Board gives voice to something that British manufacturers have maintained all along: the fact that the protection of certain Australian manufacturing industries has reached a ridiculous point. It is shown that the duties have been used not merely to enable industries to stand on their feet, but to extort excessive profits from the public, with dire effects upon the country's primary (mainly agriculture) industries. A thorough and systematic revision is therefore recommended, and it is to be hoped that this will be undertaken. Whatever decision may be arrived at, it cannot possibly worsen the position of British exporters to the market, and, indeed, may bring about badly-needed improvement.

Faraday House

ONE hears much nowadays about the lessened importance of individuality in a mechanised age. To so enervating a view the annual dinner of Faraday House Old Students' Association should provide a corrective, at any rate for those privileged to be present. The very evident feeling of *esprit de corps* among those who received their technical training at Faraday House cannot fail to be an asset to the industry and the profession that they serve, especially as so many of them occupy leading positions. The origin of this salutary influence—the "atmosphere" of the gathering left us in no possible doubt about it—lies in the individuality of the Principal, Dr. Alexander Russell. To his ability as an instructor is added the even greater gift of a sympathetic understanding of the members of his great "family," not only as engineers, but also as men. It is this more than anything else that has made Faraday House worthy of the great claim implicit in its title.

The London J.E.A.

A REDUCTION in the *flat-rate* charges for electricity of from 12½ to 33⅓ per cent. is not, of itself, necessarily a good thing for electrical development, for reasons we have often discussed here. But when this is accompanied by the adoption of a uniform two-part tariff over a wide area for domestic and other purposes, it can be said that the problem of charging is being tackled along healthy lines. This is the record of the London and Home Counties J.E.A. for the year ended with last March, but it by no means exhausts the tale of progress made. Perhaps the most useful function that the Authority will perform will be in preventing the splitting up of statutory areas now operated by companies when these become purchasable by local authorities.

Power Station Results

THE keenly awaited first working costs to be published for the Hams Hall power station of the Birmingham Corporation will afford material for renewed controversy on the important questions of cooling-tower *versus* riverside stations, pulverised-fuel against stoker firing, and unit or storage systems of pulverised-fuel firing. It is believed that the gross calorific value of the fuel consumed is something like 8,000 B.th.u. per lb., and, bearing on this, perhaps the most interesting cost figure is that of the fuel consumption—0.082d. per kWh generated, although it appears to be now almost generally accepted that the low- or high-grade fuel issue involves the wider commercial consideration of supply and demand exclusively. It is well to bear in mind that results from part-year workings are sometimes not truly representative, although the station load factor of 27 per cent. does not suggest anything of a sensational character.

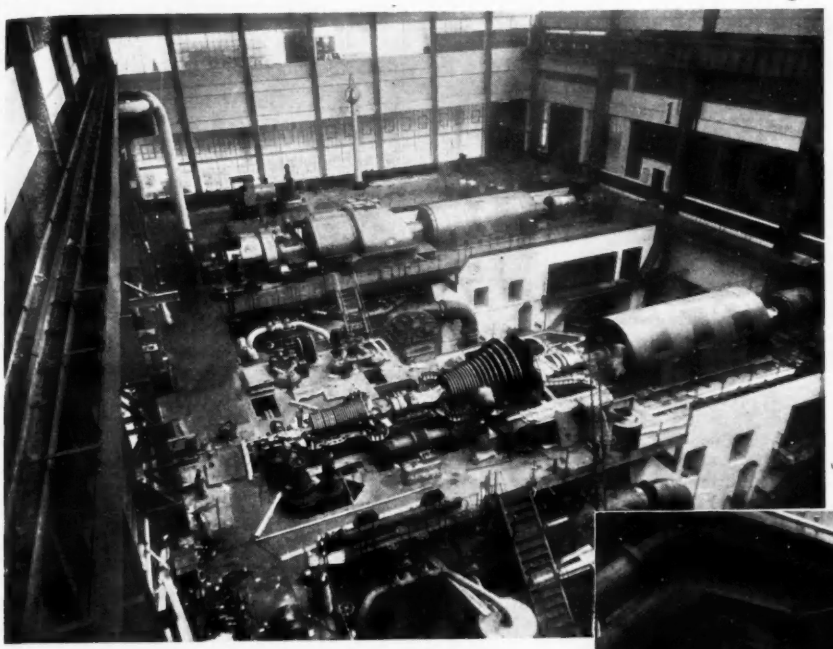
Our Correspondence Pages

READERS will notice in this issue a change in the position of our "Correspondence" section. For some time past this has been appearing toward the end of the REVIEW, but now, and in future, it will be found in the earlier pages following our articles—the part of our contents to which letters frequently relate. We invite our readers to avail themselves of the Correspondence pages for the expression of their views on any subject of electrical interest. The profession and the industry can only profit from a constant interchange of ideas between those connected with them.

Clarence Dock

The site of the new power station of the Liverpool Corporation fulfils almost all the important requirements of a modern works

IN these days of standards one looks for the distinctive features of a modern power station in its records of running, capital costs, etc. In the case of the new works at Clarence Dock of the Liverpool Corporation such records and costs figures are not available as the station is only commencing to carry commercial load. It is anticipated, however, that the coal consumption will be 1.34 lb. per kWh; but nevertheless there is certainly no lack of distinctive features. In the first place, so far as can be ascertained, this is the first instance of a generating station, at any rate, of appreciable size, having been built in a dock—and an excellent job it has made. Practically no excavation work was necessary; the dock bottom, with one minor exception, was found to be of sound rock, and it forms the basement level, while the ground level is that of the turbine floor—an arrangement so obviously ideal, but extraordinarily fortunate and indicative of foresight. Again, a large portion of the dock not actually required by the station proper has been put to advantage and forms, or will form, an excellent coal store; permanent flooding of this store is another item of unusual interest. Near the mouth of the Mersey there is copious water for condensing. Further, apart from the civil-engineering work, carried out in collaboration with Mouchel & Partners, no consulting engineer has been employed on the work, Mr. P. J. Robinson, M.I.E.E., the city electrical engineer, having been responsible throughout for the design and construction of the station—we congratulate him. There is also direct railway communication from northern collieries and, of course, excellent facilities for sea-borne coal. To crown a limited summary, as it were, the station, in the local sense, may be described as truly central, for its position is practically the centre of gravity of Liverpool's electrical load—but its output is to be taken by the Central Electricity Board and utilised—where? The other outstanding features may be taken in stride in the following description.

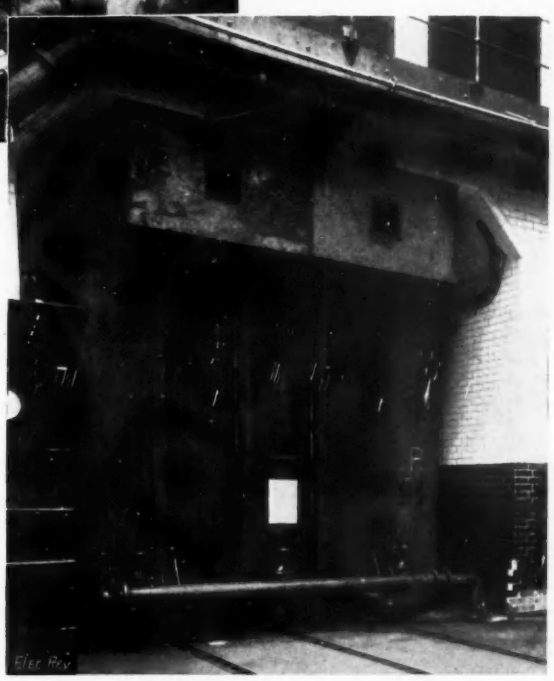


General View of Turbine Room from Crane

General Layout

The station is designed for an ultimate generating-plant capacity of 400,000 kW—eight 50,000-kW turbo-alternator sets—seven running and one standby, and a total steaming-plant capacity of 5,120,000 lb. per hour (normal). The turbine equipment will be housed in one long turbine room, and the boilers in four boiler houses with eight 160,000-lb. boilers in each. The initial section of the station includes the first section of the turbine room with two sets, the first of which was put into operation in July last, and one boiler house, at present equipped with only half its complement of boilers, sufficient to serve the first turbine. The longitudinal axis of the boiler house is normal to that of the turbine room. The station is laid out in many respects on the same lines as Lister Drive No. 3, and many of the unusual features are the same. The thermal efficiency of Lister Drive, a cooling-tower station, is 20.5 per cent. The existing section of the turbine room measures about 168 ft. long and 111 ft. wide, and is spanned by a 110-ton crane supplied by Sir William Arrol & Co., Ltd. A metal-plate gangway around the room, near the walls, and between the sets, etc., provides the only flooring at the driving level. The boiler house has dimensions of 190 ft. by 112 ft.

There are two main reasons for the existence of Clarence Dock power station. First, Liverpool's load is growing very rapidly, and early extensions were inevitable; normally an extension equivalent to at least half the first 50,000-kW set at the new station would have taken place by this time at the No. 3 Lister Drive station—in fact such an extension had been planned. Secondly, the passing of the Electricity Act of 1926, and its consequences, led to the decision to build a base-load station in the city, thus altering the first idea. A riverside station had been thought of for a long time, prior even to the construction of Lister Drive No. 3, and when the scheme was revived it was found that the old Clarence Dock was available for purchase from the Mersey Docks and Harbour Board.



Step-up Transformer housed beneath Alternator

The dock has an area of something like 470,000 sq. ft., and the present initial portion of the station is located in its south-east corner. The northern limit of the station is separated from the remaining portion of the dock by a reinforced-concrete dam or wall, rendering that part of the basin available for coal storage. In this way storage will be provided for about 85,000 tons of Lancashire and Yorkshire slack, which cannot be stacked beyond about 9 ft. deep without risk of spontaneous combustion. The dock is over thirty feet deep, and a scheme for flooding and draining the coal store has been adopted. The flooding will be up to 30 ft. and the coal will be reclaimed by the grab method. There are

two alternatives for rail transport of the coal, the L.M. & S. and the L. & N.E. railways, in addition to the sea facilities.

Coal Handling

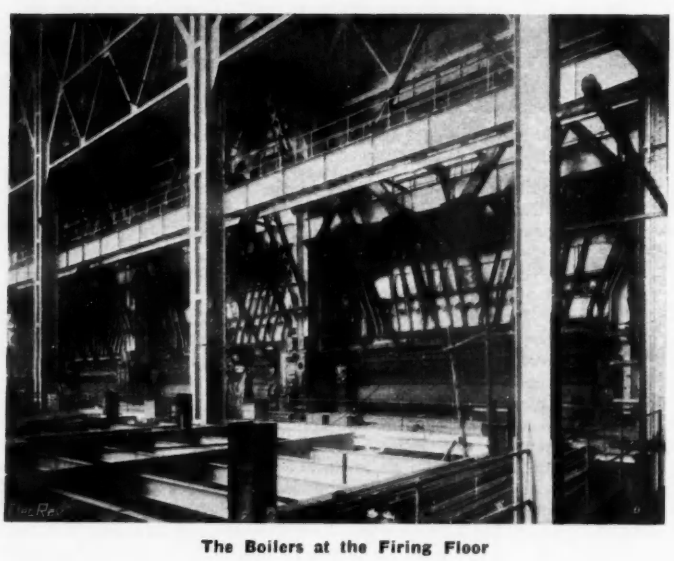
Coal is conveyed to the station in 20-ton hopper-bottom wagons which are opened out over a reinforced-concrete silo having a capacity of 5,500 tons. This simple arrangement, in which there is a conspicuous absence of wagon tipplers, has resulted in very speedy handling, and 400 tons of coal, in a train of 20 wagons, can be dealt with easily within 15 minutes. Beneath the silo the coal is fed from a number of points on to a 42-in. belt conveyor system which carries the fuel to the boiler-house overhead bunkers, *via* an inclined gantry. The conveyor has only one belt at present which is arranged for two-speed driving, with capacities of 220 and 110 tons per hour. With the second belt the total capacities will be double these figures. An interesting feature of the conveyor system is a couple of travelling hoppers which provide the necessary feeding medium between the silo outlets and the belt. They run on rails and each can be positioned under any one of the silo outlets. Interlocking arrangements between the outlets and hoppers are such that unless a hopper is beneath one of the outlets the sliding door of the latter cannot be opened, while the hopper cannot be removed from the outlet until the door is closed. Adjacent to the coal silo there is a gantry on concrete trestles carrying a double railway line for serving the coal store. Eventually there will be four such gantries—one in line with each boiler house. Arrangements are made for the conveyor system to be extended so that it will ultimately serve all four boiler houses. The conveyor system was constructed by Henry Simon, Ltd.

The Boiler Plant

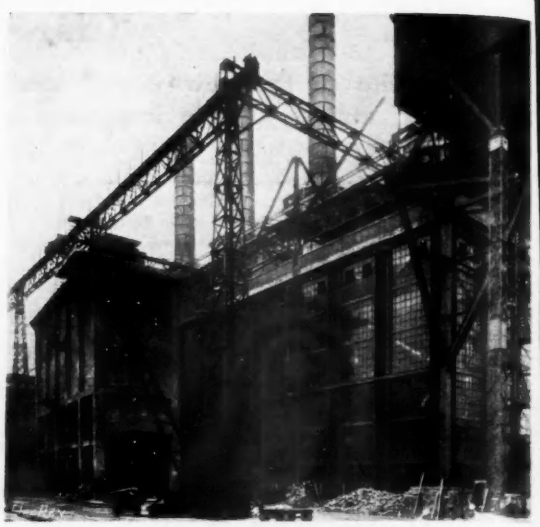
The boiler house is at present only half equipped, containing four Babcock and Wilcox boilers, each with a normal evaporation capacity of 160,000 lb. per hour and an overload capacity of 176,000 lb. per hour. Each boiler is arranged as a complete unit with an air heater, B. and W. or Carrier-Owen, economiser, interdeck superheater, firing equipment, fans, etc. The present steaming conditions are 450 lb. per sq. in. and 750 deg. F., but provision is made in each superheater for additional tubes whereby the temperature may in the future be raised to 825 deg. F. A point worthy of particular note is that each air heater is arranged at the back of its boiler, and not on top as usual. The steam generators are all arranged for stoker firing under normal loads and conditions, two of them being fitted with underfeed L type stokers and two with B. and W. chain-grate stokers.

P.F. Booster Firing

To obtain a flexibility under overload conditions comparable with oil firing each boiler is equipped for pulverised-fuel boosting. Two of the furnaces are each fitted with two No. 4 Fuller Bonnot mills and two 12-in. Lodi burners, one in each side wall, while the other two furnaces are each equipped with two No. 6 Atritor mills and two 10-in. Lodi burners. Between each Bonnot mill and the exhauster is a fan which lifts the powdered coal from the mill and forces it through the burner. The fans on the Atritors are integral with the mill housing. The Lodi burner is of the high-turbulence type with an orifice of firebrick and a plate-type disperser which is said to be immune from burning on account of its being protected by the primary air and coal on both sides. In ordinary operation, if a burner should be idle the disperser would be drawn back into the primary-air pipe for protection, but in this particular installation a firebrick damper protects the burners when the boiler is being stoker fired only. Secondary air for the p.f. firing is supplied by the ordinary forced- and induced-draught fan for the stoker firing, but from the air heater direct.



The Boilers at the Firing Floor



Ash-handling Plant

There are three bunkers to each boiler, two large ones feeding the mechanical-stoker hoppers through the usual oscillating chutes, and a smaller one in the middle for the p.f. equipment, the coal being conveyed to the mills through pipes under a simple gravity arrangement. Avery weighers are arranged beneath all the bunkers and also beneath the coal crushers on the feeds to the p.f. mills.

Regarding the boilers, as they normally are, as stoker fired, it seems curious to see such enormous combustion chambers—a necessity, of course, under p.f. firing, but experience at Lister Drive has shown this to be advantageous for stoker firing also. The average height of a chamber, from the grate level to the bottom row of tubes, is 23 ft.; the width is 30.5 ft.; and the average depth (distance from back to front) is 15 ft. An unusual feature is the Bailey water-cooled furnace walls. Water tubes which are an integral part of the boiler circulating system are covered with cast-iron blocks clamped in intimate contact with the tubes. Each block is faced with a special refractory material cast in with the block and keyed on to it.

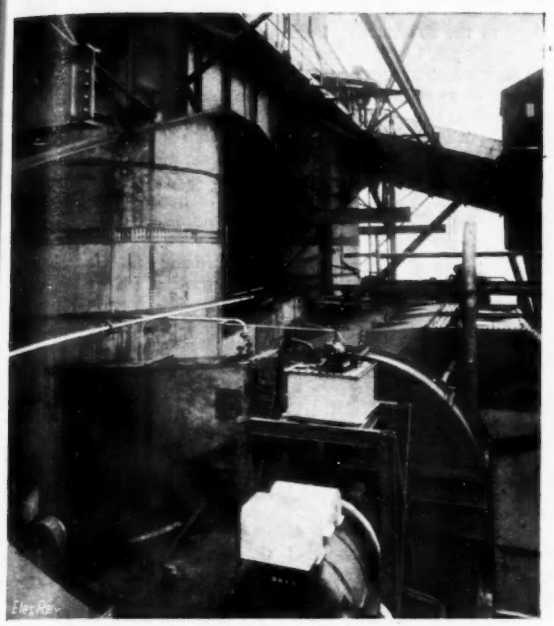
Flue-gas Washing

There are two forced-draught and two induced-draught fans to each boiler, the f.d. fans being positioned on the floor above the boiler tops, and the i.d. fans above them still on the flat boiler-house roof. Before entering the chimney the flue gases are passed through a "Pneuconex" grit arrester, and in the base of the chimney the discharge is subjected to a process patented by Mr. Robinson for removing the sulphur from the gases, so that the emissions from the stacks are practically free from both grit and sulphur. In the duct between the i.d. fan and the stack the gases are subjected to two fine water sprays, so that in the chimney subsequently they enter fairly moist. An enormous downpour of water in the stack removes the sulphur in the form of sulphuric acid. The sprayers for the final treatment are fed from a trough round the chimney, which, in turn, receives the water under gravity from an overhead tank to which the water is pumped from suction ducts in the station. The "rainfall" is equivalent to a minimum of 6,000 gal. per hour, and the chimney is about 19 ft. in diameter. The ashes from beneath the boilers are dealt with by simple scraper conveyors which dump them into a tank cut out of the solid rock in the bottom of the dock. By simply continuing the chains the ash scrapers will serve the future boiler houses. From the tank they are lifted by a grab crane and dropped into a reinforced-concrete overhead bunker beneath which railway or road wagons are loaded from suitable hoppers for removal. There is no market for the ashes.

The boilers are separately arranged for electrical

remote combustion control from the firing floor, each unit having its own control and instrument board equipped fully with the usual modern instruments, including remote temperature indicators, etc. The speed control of both the f.d. and i.d. fans is effected by altering the height of a weir governing the oil level in the hydraulic couplings. Liverpool is believed to be the first undertaking in this country to adopt the hydraulic coupling for its fan drives.

Of particular interest is that a scheme is under consideration for the automatic combustion control of one boiler. The scheme has been developed co-operatively by Mr. Robinson, the Metropolitan-Vickers Electrical Co., Ltd., and the Electrofio



I.D. Fan, Grit Arrestor, etc., on Boiler-house Roof

Meters Co., Ltd., and includes a master regulator governing the speeds of the fans, etc., according to the variations in steam pressure.

Soot blowing by compressed air is likely to be a successful experiment by reason of economy in steam consumption and hence make-up water. For this purpose a Daniel Adamson electrically driven compressor with a capacity of 4,000 cu. ft. per minute is installed.

Steam from the four existing boilers is conveyed by four independent ranges to a common receiver from which two main pipes supply the first turbine, each pipe being capable of serving the turbine under full-load conditions. The second receiver for the four boilers not yet installed is already established, and will serve the second set by means of two interconnectors between the receivers. Eventually, with the full complement of boilers, the interlink will serve for flexibility of operation. A point of interest is that all the joints in the steam pipes, except those at the valves, are of the Spencer welded construction.

The turbines, running at 1,500 r.p.m., were supplied by the Metropolitan-Vickers Electrical Co., and are of the twin-cylinder type, designed for a stop-valve pressure of 400 lb. per sq. in. Each turbine is bled at four stages, two serving low-pressure feed-water heaters and two supplying high-pressure heaters. All the heaters are of the M.-V. U-tube construction.

The Water-feeding System

The feeding system is arranged on the closed-circuit principle, with the two l.p. heaters between the extraction pump and the lift pump, and the two h.p. heaters between the lift and feed pumps, the idea being to minimise the water pressure on the heaters. The temperature of the condensate at the extraction-pump discharge is 83 deg. F., and at the inlet to the main feed pump the feed-water conditions are 320 deg. F. and 128 lb. per sq. in. For normal conditions there are at present two electrically-driven pumping sets, each including both the lift and feed pumps, and one steam-driven set. The steam set is intended for emergency conditions only and exhausts to atmosphere. It does not include the lift-pump feature, and conveys the water in one stage immediately to boiler pressure, cutting out the h.p. heaters, but pumping through the l.p. heaters. It is interesting to note that for the surge tanks use has been made of some old Lancashire boilers. All the pumping sets were supplied by Mather and Platt, Ltd.

The condensers are of the M.V. contra-flow type from which air is extracted by three-stage jet ejectors. The circulating water is conveyed from the River Mersey through twin reinforced-concrete ducts, each capable of providing water for one circulating-water pump of each condenser, thus permitting one to be shut down for cleaning, etc. After passing through coarse fixed screens at the river inlet the water enters a chamber at the original dock entrance. Sand is deposited in settling tanks excavated in the bottom of this chamber, the system being so designed that the water velocity is sufficiently low to enable the sand in suspension to settle. The sludge is pumped back into the river. At the junction of the settling chamber and the ducts chlorine gas is discharged into the water from "Chloronome" equipment supplied by the Paterson Engineering Co., Ltd. The water is subjected to a final straining at the condenser entrances where there are installed, between the condensers and M & P. circulating pumps, Bailey-Jackson rotary strainers supplied by Hick-Hargreaves, Ltd. The screens are rotated very slowly under belt drive from a small motor. Each pump and strainer set normally serves one half of the condenser, but interchanging is arranged for. The particular aluminium-bronze alloy adopted for the condenser tubes, supplied by the Yorkshire Copper Co., Ltd., was chosen after very careful investigations extended over a year of samples of water taken from the river at all tides and times, various alloys being subjected to immersion tests in the water samples. The water from the condensers is discharged into the river at a point 460 ft. south of the suction inlet, *via* discharge ducts laid under the adjacent Trafalgar lock. Pumping power has been considerably reduced by the utilisation of siphonic action.

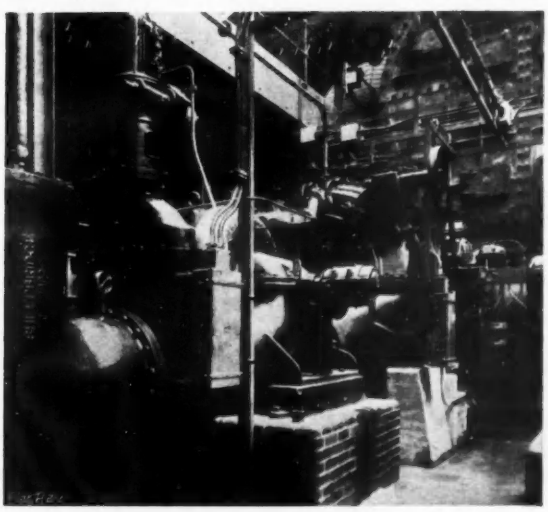
Alternators and Switchgear

The M.V. alternators generate at 7,300 V, three-phase, 50 periods, and each alternator is directly connected through isolating switches to two 35,700-kVA forced oil-cooled step-up transformers, 7,300-33,000 V. The controlling oil circuit breakers are on the 33,000-V side, and each transformer can be isolated as required on both the 7,300-V and the 33,000-V sides.

The alternator has a closed-circuit ventilating system, the circulation being provided by fans on the rotor, and also by two motor-driven fans. An unusual feature is the housing of the step-up transformers in the condenser basement and underneath the alternators.

The main 33,000-V switchgear is of the cellular type with oil circuit breakers having a rupturing capacity of 1,500,000 kVA, and was provided by the British Thomson-Houston Co., Ltd. This is housed in a separate room, located on the south side of the turbine room, and has provision for extension with the turbine room in a westerly direction.

The control room is at the east end of the turbine room, and a pleasing feature is the exceptional commanding view from it



Main Circulating Pump and Strainer

of the turbine room through expansive plate-glass windows in the partition wall. The control equipment is fairly standard, the various boards being of the B.T.-H. closed-panel type.

A clever piece of civil engineering work is represented in a cable tunnel in the basement and leading out under the adjacent road. At the point where the sections change from side by side to one over the other, the outside walls run downwards and form those of the bottom section, and the racks on either side of the partition wall are carried outwards so as to meet those on the walls of the top section.

In conclusion, we wish to convey our thanks to Mr. Robinson for the courtesy extended to us in allowing our representatives to visit the station to collect the above information and to take the photographs.

Aspects of Engineering Insurance. By L. A. Griffin

THE time is past when insurance was considered a luxury to be enjoyed by the comparative few, but even to-day when the more standard forms of insurance are understood, and even considered a commercial necessity by the prudent majority, it is surprising how few users of power plant fully avail themselves of the undoubted benefits conferred by an engineering insurance policy.

A great part of the diffidence displayed when the question of engineering insurance is mentioned, arises from an inherent suspicion in the minds of many engineers, that should the door be opened by an insurance policy, an engineer's job would be subject to constant and irritating surveillance by faddy officials. That this view is totally at variance with actual practice will be obvious to the intelligent observer if a little consideration be given to the matter in its widest bearings.

Let us examine the objects of an engineering policy. Like all classes of insurance it was primarily designed to relieve the policy-holder of any financial loss to which he would otherwise be subject in the event of an accident to his plant.

In this respect the cover provided is comparable with that given by a fire policy for his premises, or an accident policy for his personal well-being. An engineering insurance goes much farther than that, however, and actually, by periodical inspection of the plant insured, reduces the incidence of claims by preventing avoidable accidents.

As the interests of the owner and those of the insurance company are mutual, *i.e.*, the prevention of plant breakdown and its attendant losses, this aspect of insurance must be of interest to the potential insurer.

The insurance companies being in existence to produce a dividend for the benefit of their respective shareholders, it behoves them to exert every effort to minimise breakdowns and resultant claims. With this end in view only the most highly trained and fully qualified surveyors are employed.

In effect an engineering policy guarantees that the plant mentioned in its schedule will be kept free from breakdown by the company's surveyors, and that in the event of failure the insurance company will indemnify the owner to the full extent of his loss by repairing the plant or making a cash settlement in lieu thereof.

Where electrical plant is concerned, the value of independent inspection cannot be over-estimated, as the wide and varied experience gained by insurance engineers is invaluable in detecting those incipient faults, which, when neglected may, and frequently do, result in serious and costly failures.

Another benefit enjoyed by a policy-holder is service in the way of advice and help in any matter bearing on the safe, economical and efficient working of the plant.

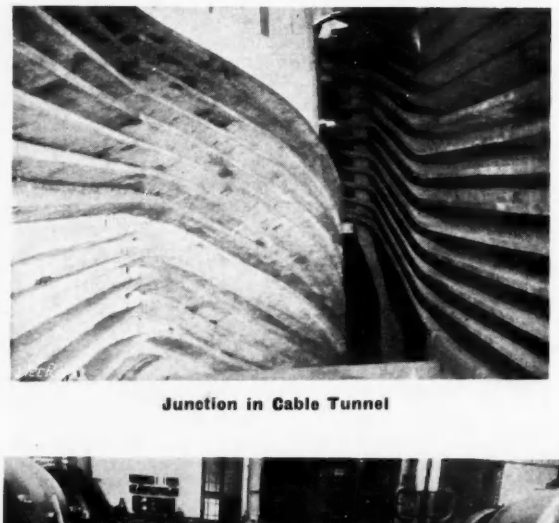
As an example: perhaps the insured may decide to run a dynamo as a motor, or vice versa, but he is somewhat doubtful as to the suitability of the machine; all that is necessary is to call upon the resources of the insurance company, which will be pleased to render every assistance.

Many users of electric power have been confronted with unusual and varied problems as a result of the change-over from direct to alternating current supply in connection with the National Grid scheme, and the insurance companies in numerous instances have been the means of avoiding unnecessary expense and inconvenience to the insured.

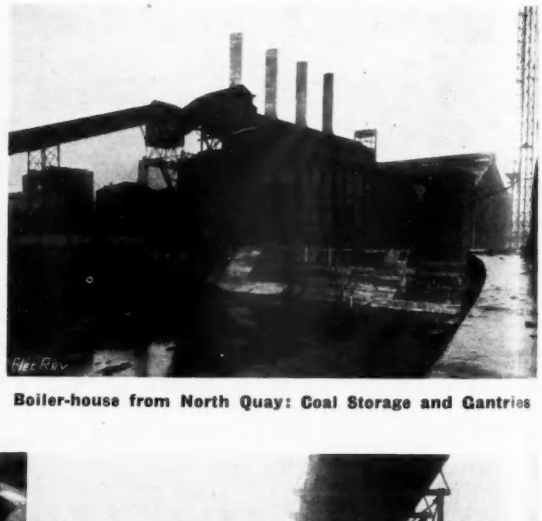
With regard to the actual policy, the cover, which in the case of the leading companies is already most comprehensive, is extended in one instance by a non-tariff office to include all overtime charges and labourers' assistance; this is a valuable concession.

It is safe to say that, in these competitive days, potential policy-holders may be assured that an engineering policy contains no aggravating conditions, and is drawn up to represent an equitable contract for both parties, and whilst the periodical reports issued to the insured often contain suggestions and recommendations for the better and safer operation of the plant, *their non-adoption does not in any way affect the validity of the policy.*

If the public had access to the claims records of the various companies it would be a surprise to many to observe the generous spirit displayed in dealing with claims which, though strictly outside the scope of the policy, are often sympathetically considered; ex-gratia payments are of daily occurrence.

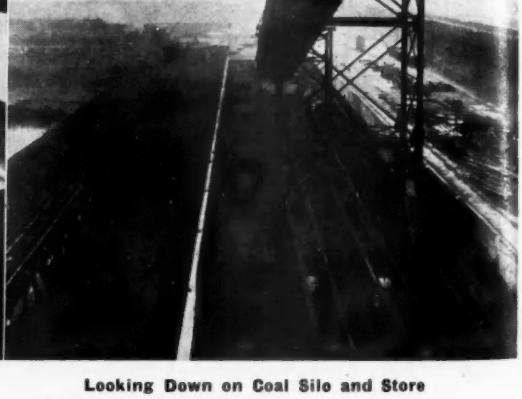


Junction in Cable Tunnel



Boiler-house from North Quay: Coal Storage and Gantries

Condenser Basement between the Two Sets



Looking Down on Coal Silo and Store

Further Views of the Clarence Dock Power Station

Sell More Electricity! By Victor W. Dale

The Business Manager of E.D.A. says: "We are doing well, but we can do better"

THE burden of responsibility for keeping the wheels of the electrical industry turning lies very heavily upon those people whose dealings are directly with the *ultimate user* of electrical energy: this contribution is therefore particularly directed to electricity suppliers, contractors and retailers. It will neither attempt to penetrate the whys and wherefores of the present trade situation, nor trespass upon investigations which rightly belong to politicians, financiers and economists. But, ignoring academic considerations, it will make a searching, if general, inquiry into the potential electrical market and existing sales organisation, quoting plain facts and figures and appealing to the "horse sense" of the industry.

It will ask the industry to decide whether the work being carried out by an efficient, but quite inadequate, band of workers really represents all that is needed to acquire, as rapidly as is vitally necessary, the vast volume of business which most certainly must be secured in order to preserve a proper relationship between capital and revenue. Above all, it will appeal to those who contribute in any shape or form to the policy or control of electrical selling organisations, to call a halt to current relaxation nonsense.

Mr. V. W. Dale as Business Manager of E.D.A. is in close touch with development activities all over the country

Away with Pessimism!

The industry is a long way from Carey Street: few things in these uncertain days are more certain than that with the establishment of settled Government national confidence will be restored and money will flow more freely than has been the case for longer than it is pleasant to remember. At this very moment there are on the one hand the usual croakers foreboding further imaginary crises, while on the other are to be found some of the most astute business men in the country not only convinced that we have seen the bottom of things but backing their conviction by considerably extending their business interests.

If we *are* swaying on the edge of a precipice, be certain that the first to crash will be those pessimists who wail that things are bad and then immediately proceed to make them infinitely worse by curtailing those paramount services of sales and publicity which are invoked to maintain and increase business when conditions of demand are normal, and become quite indispensable when business is bad.

Greater Activity Essential

It is not suggested for one moment that the disease of sluggishness or inertia completely overshadows electrical retailing—on the contrary—but the microbe has undoubtedly manifested itself here and there, and it is therefore highly desirable to isolate endemic areas and prevent infection. It is equally necessary here to warn those who probably have not observed it that our healthy friend the enemy, far from curtailing his customary energetic and admirable activities as an organised industry, is actually planning to increase them, while individual undertakings are developing consumer service and load-building departments very much in advance of most of our own undertakings.

In the interregnum which separates acute trade depression from the advent of trade revival, every electrical organisation is morally bound to strain its entire resources to the utmost to maintain prestige and goodwill. We have reached a stage in electrical development when electrical methods, to use a modern phrase, are practically "sold" to every class and branch of the community. Failure to maintain the resultant acceleration will definitely involve irreparable losses, probable unfavourable revisions of tariffs, and will precipitate a setback from which it will take a decade to recover. Any individual who permits himself, at the moment at any rate, to be scared with undue haste into curtailing sales and publicity organisation is opening his door to the wolf and doing the greatest possible harm to the corporate body of the electrical industry.

Organise for Selling!

Those who in recent years have been able to reconstruct their selling organisation on an efficient and modern foundation will agree that substantial augmentation of personnel and material is absolutely necessary in all organisations similar to their own. In many directions managements are heroically struggling along with hopelessly inadequate staffs in a vain attempt to secure and handle the vast and certain potential business which, be it clearly understood, is in a seller's, and not a buyer's, market—and must therefore be created.

The evidence of recent travellers makes it clear that as regards electrical and mechanical engineering practice Britain retains her premier position but that on the commercial side we are completely outclassed by American, Canadian, and to some extent by Continental practice.

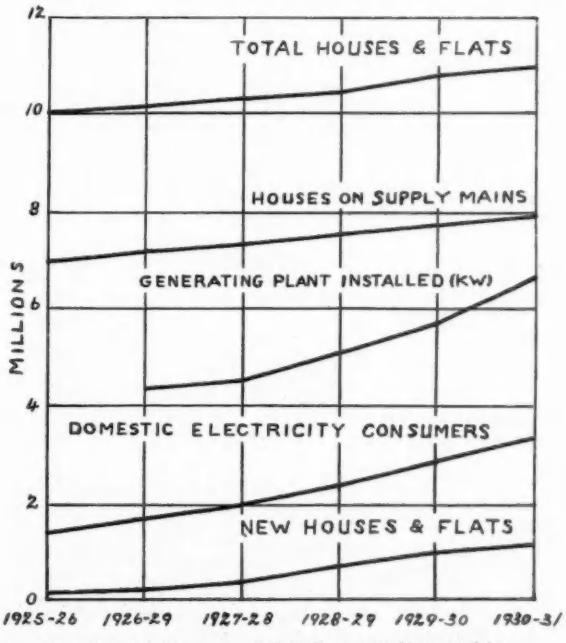
The late Dr. Ferranti with his unfailing prescience foresaw clearly in the last year or two of his valuable life the vital necessity for lubricating the wheels of merchandising and discovering new fields to conquer. The only practical solution appears to be the will and intention to explore the potential electrical market in minute detail in order to convince ourselves that it is vitally necessary to revise our former ideas as to what constitutes efficient sales organisation. At the same time we shall discover that anæmic, irregular, and spasmodic selling schemes cannot possibly keep pace with the demand which, it can be shown, is ours for the *creating*.

Domestic Electrification

In the first place, take domestic electrification as an example. In 1926, when E.D.A. and E.L.M.A. organised the "Wiring of the Homes of Britain" Campaign, it was shown in the programme of that campaign that out of 10,000,000 homes in Britain 7,000,000 were situated on the mains of electricity supply undertakings, but that only 1,400,000 were wired. It was further shown that installations for the unwired homes represented a potential sale of not less than 1,400,000,000 additional kWh per annum by supply undertakings, not taking into account increased consumption by existing consumers. It was also estimated that a potential £112,000,000 worth of business was available for contractors, and certainly not a smaller amount for manufacturers, wholesalers and retailers.

Five years have rolled over our heads and we take account.

Admittedly, with regard to the rate of connections, great strides have been made over the previous four years; we have



The Rate of Increase of Building and House-wiring

actually more than doubled the number of domestic connections as shown in the accompanying diagram—but closer investigation shows that with an augmented and efficient sales organisation distinctly better results could have been achieved.

The diagram, compiled as far as possible from available published statistics, indicates the scope for immediate and ultimate development. It is to be observed that although there has been an increase of approximately 1,850,000 domestic

connections in the five-year period, more than 1,000,000 new houses and flats have been assessed for the first time. The "plant-installed" curve also indicates the need for more rapid acceleration.

Against the 1,850,000 new consumers obtained in the years 1926-1930 we must take account of the great increase in the number of houses (excluding shops, hotels, etc.), which has averaged about 200,000 a year.

During the same period approximately 125,000 other new buildings, such as shops, hotels and non-residential premises have been constructed, most of which presumably have been wired.

The relative position regarding wired and unwired houses in 1926-27 and 1930-31 is as follows:—

	Unwired houses and flats	Unwired houses on the route of mains.	Wired houses
1926-27	8,600,000	5,600,000	1,400,000
1930-31	7,950,000	4,550,000	3,250,000

A Tremendous Scope

So we find that out of five and a half million houses on the mains in 1926, only three quarters of a million have so far been connected; consequently, apart from unwired new houses, there are no fewer than *four and a half million* unwired houses still to be found along the routes of existing mains, and nearly eight million which will be reached in a few years. Now, seeing that more than three hundred supply undertakings have adopted assisted wiring schemes, it is obvious that something more than "facilities," or even extremely favourable rates and tariffs, is fundamentally necessary for increased acceleration, and that "something," it is submitted, is an adequate and efficient selling organisation, and a clearer and more up-to-date conception of the proper ratio of production and selling costs.

Even assisted wiring schemes will not sell themselves! In passing, it is desired to express the opinion that progress will be assisted by arranging to keep installation repayments separate from energy charges; consumers will thereby be encouraged to use the supply for purposes other than lighting.

This statement regarding the insufficiency of "facilities" requires to be emphasised most strongly because it is so frequently heard that our problem is simply a matter of getting rates and facilities right when business will come naturally —an argument nearly as futile as the monopolistic fallacies generally prevalent in the industry a quarter of a century ago. The fact that technical efficiency is on a higher plane than sales efficiency additionally supports our argument since average works costs have decreased from 1.07d. in 1927, to 0.70d. in 1930, and the price per kWh sold from 1.62d. to 1.21d.

Those unqualified comparative *per capita* figures for units consumed in various countries published in the lay press from time to time are misleading, but it would be emulating the ostrich to deny that Great Britain's figure of 176 (in the last published returns) suggests ample room for load buildings.

The Contractor's Duty

—The installation contractor cannot be entirely relieved of responsibility in this matter. So long as the public is not continually advised to avoid cheap and inadequate initial installations so long will the demand for energy and appliances be restricted. In this one direction there is an enormous amount of business waiting to be created, yet hundreds of thousands of consumers continue to use a miserable one or two hundred kWh per annum, and, in comparison with the appeals of other trades, it is really a feeble effort that we are making to encourage and educate them to use electrical service more freely.

Every supply and retailing organisation in the country would be well advised to organise a very thorough market investigation, employing men who are regular foxes at the job, recording in completest detail prospects for electricity and every conceivable electrical appliance. It is more than likely that from 70 to 80 per cent. of gas consumers—*our lawful prey*—reside along the routes of existing electricity mains; in the year 1928 gas consumers contributed £68,200,000 to our rival's exchequer. Is further evidence of the potential electrical market required?

Showrooms

There is room for improvement in some of our electrical showrooms. An electrical showroom should be a place in which, within economic limits, the multitudinous and increasing number of electrical fittings and appliances can be displayed and the public service of electricity reasonably demonstrated; this simply cannot be done efficiently where frontage and floor area are equivalent to those occupied by a suburban hairdresser. There is, of course, a gratifying and an increasing number of exceptions, but many showrooms still convey an impression that the electrical industry has nothing more than arrays of silk shades or cookers to offer the public, so strikingly are one or other of these two accessories emphasised to the exclusion of a hundred other practical applications.

It is impossible here to introduce more than two or three examples of these omissions. Consider, in the first place, the fractional h.p. motor—an essentially practical device which could be introduced into hundreds of thousands of homes. At present this apparatus is scarcely thought of except as a component in a domestic appliance, or as an accessory for commercial purposes, *e.g.*, signs, office appliances, etc. Yet, supplied with an extended spindle and a set of polishing brushes it could be marketed as a second-to-none labour-saving device. Then again, the electric washing machine. If a hundred suburban or provincial housewives were asked if they were conscious of ever having had brought aggressively to their notice all the advantages and information with regard to initial and running costs of an electric washing machine, would the replies suggest any sort of organised selling effort?

Then there are refrigerators. Before the last Budget there were in this country nearly two and a quarter million direct tax payers; amongst them there would be an interesting number of, shall we say? motor car prospects. Why not refrigerators? The motor car manufacturer has created most of his business by selling health and pleasure on the open road. That industry, to its credit, has not smugly assumed that nobody can afford to buy a car. As a result, out of over two million licences issued, no less than seventy-five per cent. relate to private vehicles.

Further Investigations

Our market investigation would take into account the penetration of industries and businesses, and it would follow closely also the trend of current events. For example, at the present time, most of the large breweries are erecting model licensed houses in all parts of the country: little imagination is necessary to visualise the possibilities of electrical penetration for lighting, heating, cooking, pumping, washing, water heating, etc., in these places.

Consider industrial heating: in addition to various types of furnaces, electric heating can be employed in pottery making, glass-making, rivet-heating, welding, the heating of liquids, chromium plating, in various forms of pressing and moulding, in printing for linotype metal, etc. In these and many other applications there is an overwhelming and almost untouched market. Garages and motor workshops require portable tools, vulcanisers, distillers, arc welders, and many other tools; such establishments are first-class prospects.

Baking ovens are another possibility. Let it be assumed that evidence is available regarding the practicability of bread-baking by electricity. If it can be shown that, under the right conditions and at a given economic price for electricity, a case has been made for baking, to the ultimate satisfaction of the trader and the consumer, surely to goodness there must be hundreds of cities and towns in the country in which almost identical conditions and prices obtain, or can be secured, and in which a man, relieved of all other pre-occupations, should be appointed to study and pursue this class of load for a year at least. For our 12,000,000 families there must be at least 25,000 bakers in the country to be dealt with; if the cash-register man and the automatic-scale man can sell their respective wares to this small trader, the electrical man can sell his, given a proper chance to do so.

As regards industrial power, our factories at present are stated to be not more than 50 per cent. electrified.

So one could go on in this way almost indefinitely cataloguing business possibilities and opportunities: the more closely we investigate, the more we shall convince ourselves of our prospects, and the more we shall convince ourselves also of the inadequacy of existing sales organisations in most places.

Remove the Handicaps

Tribute must be paid to those undertakings which *have* opened modern showrooms and established efficient and complete sales organisations: where they exist they command the liveliest admiration.

Light, heat, power, or any of the services which electricity can render are our lawful fields, and the supply industry, with its £350,000,000 capital, should not be hindered in organising in such a way as to get the utmost out of them both from existing and potential consumers.

It is not expected that more can be accomplished than is being accomplished with existing personnel. Not only will it be found incumbent upon the industry to augment its personnel, but it will be found necessary to augment advertising and publicity activities, employing advertising which will not merely make the public interested in electrical methods, but which will make electrical methods interesting to the public—advertising which will not merely sell, but which will make the people buy.

Possessed of this knowledge and help, and having absolute belief in ourselves and the work upon which we are engaged, the future of the industry can be approached with an enviable confidence.

Electrical Appliances in South Africa. By E. Poole, A.M.I.E.E.

Opportunities for British manufacturers

FINANCIAL assistance given to their consumers by the municipalities of South Africa has largely been responsible for the growth in the installation of appliances there, and some idea of the extent to which advantage has been taken of this assistance may be gained from the accompanying Table of Domestic Development.

Durban occupies a leading position by having made advances to the extent of some £148,000. Briefly, the terms of the Durban assisted-purchase scheme are that the Corporation is prepared to give financial assistance on approved apparatus and, to prevent unfair profits, the selling price is limited to 25 per cent. of the landed cost plus £2.

Consumers in the borough are required to pay a deposit of 10 per cent. and those out of the borough 20 per cent.; the balance, bearing interest at 6 per cent., has to be paid off in periods varying from three years to twelve months, depending on the class of apparatus and whether the consumers are owners or tenants of the property. Guarantors are required in support of the consumer's undertaking, which is in the form of an agreement, by which the Corporation is fully covered against loss. It is worthy of note that in only one instance has it been necessary to deal with a consumer who was unable to complete his obligations, by taking over the appliances, due allowance being made in respect of any payments made.

Assistance is given in regard to wiring and appliances, but more often than not the wiring is paid for without any financial assistance. Hiring-out of apparatus may generally be ruled out in South Africa.

One of the Capetown Showrooms

The question of the servicing of apparatus has proved as

Town and White Population.	Units Sold. *a*Total. *b*Domestic.	No. of Consumers. *a*Total. *b*Domestic.	Domestic Tariff (Monthly). Basis Rate.	Secondary Rate.	Special Rates.	Appliances Installed. Stoves.	Water Heaters.	Refrigerators.	Bakers' Ovens.	£ Advanced by Assisted Purchase Scheme.	Remarks.
Durban .. .. (86,296)	*a*96,813,746	*a*22,667	5d. less 10% on valuation	½d. less 10%	Bakers' ovens and water heaters (restricted hour) .4d.	8,428	5,369	1,239	3	148,000	Supplying all suburbs within 16 miles of the Borough. Semi-bulk supply by Elec. Supply Com. Gas Co. operating.
Capetown .. .. (146,249)	*a*65,170,679 *b*17,201,035 (1930)	*a*31,610 *b*11,601	1s. 8d on room basis, 5s. to 20s. min. or max.	¾d.	Water heating, 30s. per kW. continuous, equal to .5d.	2,555	2,000 (approx.)	300 to 400	8 (small))	58,690	1,504 stoves added during last 10 months. Supplying suburbs beyond Borough. "Resonant control" for water heaters is projected at ½d.
Johannesburg .. (201,784)	*a*82,623,671	*a*39,064	6d. on room basis	¾d.	—	1,500	100	2,700	3	17,380	Municipal Gas.
Pretoria .. .. (61,627)	*a*36,000,000 *b*17,000,000 (approx.)	*a*9,114	5d. on valuation	¾d.	Water-heating, 10 p.m.–8 a.m., ¾d.	1,417	399	163	1	24,698	Supplying suburbs 12 miles beyond Borough.
Pietermaritzburg.. (21,199) ..	*a*9,302,141 *b*3,634,169	*a*4,720	6d. on room basis less 10%	1d. less 10%	Water heating, 3s. 9d. per 100W. Bakers' ovens (restricted hour at .75d.	832 (approx.)	267 (approx.)	177 (approx.)	1	28,612 (approx.)	Supplying all suburbs within 6 mile radius. Bulk supply from Elec. Supply Com.
Bloemfontein .. (23,361)	*a*11,580,512	*a*5,000	4s. to 18s. per house on valuation	¾d.	Water-heating ¾d. or 3s. per 100W continuous	500 (approx.)	80 (approx.)	No record	—	2,900	—
Port Elizabeth .. (43,748)	*a*22,813,646 (1930)	*a*7,979	6d. on valuation less 5%	¾d.	"Off Peak" supply to large consumers	499	200	100	6	10,000 (wiring only)	Supplying Uitenhage in bulk (21 miles). Walm erGas Co.
East London .. (27,394)	*a*8,648,849 *b*1,711,618	*a*4,955	8d. on valuation, 7d. under consideration	1d. ¾d.	Water-heating 2s. 6d. per 100W.	228	161	50	2	Under consideration	Supplying Cambridge (5 miles).
Kingwilliamstown (6,542)	*a*2,115,068 *b*957,748 (1930)	*a*1,156 *b*820	9d. on room basis less 10%	¾d.	—	170	127	30	1	30,000 (approx.)	KWh sold increasing at rate of 21% per annum.
Benoni .. .. .. (17,612)	*a*2,447,715 *b*995,652	*a*2,741	5d. on room basis	1½d.	—	133	40	—	—	—	System overloaded at present. Reconstruction under consideration. Bulk supply from V.F.P. Co. Gas Co. also.
Grahamstown .. (7,592)	*a*891,946 *b*345,879	*a*1,168	9d. on valuation	1d.	—	100 (approx.)	20 (approx.)	35 (approx.)	—	12,471	
Uitenhage .. .. (9,347)	*a*2,070,162 *b*598,290	*a*1,724	8d. on room basis.	1d.	—	98	18	10	1	1,702	Bulk Supply from Port Elizabeth.
Worcester .. .. (4,759)	*a*1,272,538 *b*576,920	*a*1,387	8d. light only 2d. to 1d. cooking only both on sliding scale		Water-heating, 20s. per kW. continuous	88	140	11	2	No records	—
Cradock .. .. (3,608)	*a*966,000 *b*360,000	*a*760	2s. 6d. per £100 valuation	1d.	Water-heating under consideration	70	15	6	—	No records	Supplying 6 miles beyond Borough.
Queenstown .. .. (6,600)	*a*1,273,812 *b*459,107	*a*1,275	9d. on room basis	3d. to ¾d.	Water-heating 2s. 6d. per 100W	62	45	20	—	70	System overloaded at present. Reconstruction under consideration.
Ladysmith .. .. (3,650)	*a*1,202,096 *b*439,167	*a*789 (1930)	6d. on valuation less 10%	¾d. less 10%	—	47	19	11	—	No records	Bulk supply from Elec. Supply Com.
Kimberley .. .. (18,403)	*a*3,155,411 (1930)	*a*3,627	7d. less 1d. on valuation	1d.	—	40	40	100	—	Under consideration	Bulk supply from De Beers Co.
Stellenbosch .. (4,700)	*a*460,650 *b*18,463 (1930)	*a*916	9d.	1½d.	Water-heating 30s. per kW. continuous	35	40	10	—	—	Bulk supply from Elec. Supply Com.
Gwelo (Rhodesia) (2,000 approx.)	*a*575,035 *b*139,854	*a*359	1s. room basis	1d.	—	23	15	5	—	108	—
Mafeking .. .. (2,300)	*a*263,981	*b*305 (1930)	1s. room basis less 5%	1d. less 5%	—	12	—	3	—	Under consideration	Stoves have only been installed since March 1931.
Heidelburg .. .. (2,004)	*a*192,139	*a*368	11d. on valuation since Aug. 1931	1d.	Water-heating 2s. per 100W. restricted	7	1	6	—	—	Bulk supply from V.F.P. Co.

Table of Domestic Development in South Africa, August, 1931

thorny a matter as has been the question of sales by town councils, and, where reliable contractors are established, it is agreed that municipalities should not enter into competition with them by trading or "poaching" on their preserves. Where assisted payment schemes are in operation, however, the position is not quite the same, and in some towns servicing is covered by the terms of the deferred payment scheme with the proviso that the apparatus shall remain the property of the Council until all repayments have been made.

Overhead Line Construction in Durban

Origins of Apparatus

Canadian cookers of the Moffat, McClary and Gurney makes are very popular. British cookers are at last coming on to the market with a similar attractive appearance in glazed porcelain enamel, but it may not be an easy matter now to capture the market.

In water heating, local manufacturers have put on the market some greatly favoured makes, though the lagging question has not been given full consideration, but the price has proved attractive as against the imported article, with its thermostatically controlled element, a Swiss make of which is popular in some towns.

Refrigerators are making very good headway, the "Frigidaire" being as popular as its name (which is often applied to other makes of refrigerators by the consumer), its early arrival in the field accounting very largely for its popularity. Another by the General Electric Co. (Inc.), is also well to the fore; the "Electrolux" of British make is also in good demand, and it is pleasing to see other British makes now coming on the market. The average refrigerator of 5 cub. ft. sells at about £65, and, for the information of the British manufacturer, there would appear to be an opening for one of a smaller capacity at a more attractive price.

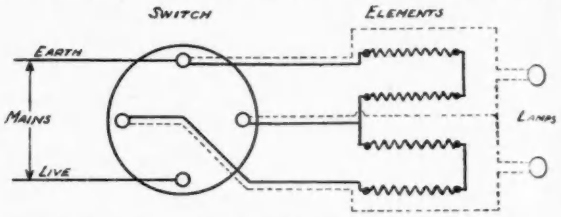
With regard to bakers' ovens, though there are only a few installed, British makes are well supported and some of the towns offer a cheap restricted-hour supply to attract this class of business.

Small Accessories

A large assortment of accessory apparatus is in use, British kettles, irons, and radiators well holding their own. More attention should be given to the old bugbear of the connecting flexible cord, and it is just possible that legislation may yet force the adoption of a safer means of connection, such as flexible connection embodying a third wire through a three-pin plug so as to earth all possible apparatus, fatalities from charged apparatus having been too frequent of late. While great care is taken generally to earth stoves and other large apparatus, portable apparatus, which is more likely to give trouble, is left to take care of itself. In this country, it has to be remembered, natives or Indians with bare feet on concrete or tiled floors take the place of the usual housemaid in England.

Indicating Lamps for Cookers

The use of indicating lamps for each element of a cooker is well worth considering; not only would it prevent the current from being needlessly left on, but, more important still, it would show at a glance the existence of a faulty

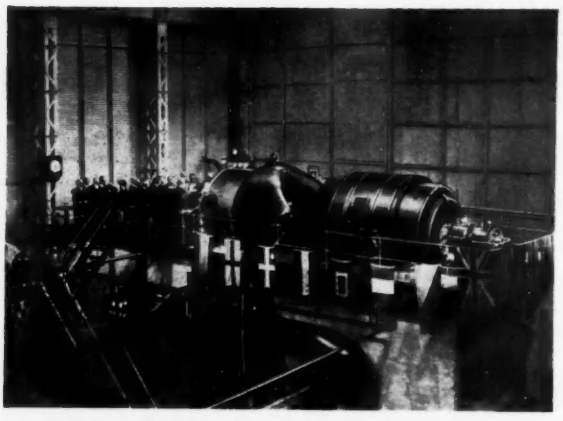


Method of Connecting Indicating Lamps to Elements

element. If such lamps were connected as in the accompanying diagram, when two elements were connected in parallel both lamps would burn brightly, if only one element was on one lamp would burn, and if the "low" heat was "on" with the two elements in series both lamps would burn dull. Should either element fail the order of the lighting of the lamps would be disarranged and thus enable the consumer to know at once that an element had failed, which failure might not otherwise be suspected for several days.

The King's Wharf Station, Auckland, N.Z.

THE King's Wharf power station of the Auckland Electric Power Board supplies power at 6,600 V on a 3-phase, 50-cycle system. Between 1922 and 1924 four additional turbo-alternators were ordered, one of 3,000-kW capacity, and the others of 5,000 kW each. The alternators were manufactured at the Witton works of the General Electric Co., Ltd., and are direct-coupled to multi-stage impulse-type steam turbines, built at the company's Fraser & Chalmers works.



The New 15,000-kW Set at the King's Wharf Station

In 1930 the failure of the hydro-electric generating station at Arapuni, due to subsidence of the foundations, made it necessary to increase the capacity of the power station, and a new 15,000-kW, 3,000 r.p.m. turbo-alternator was erected and was ready for running in March, 1931, less than nine months after the order was placed.

The inaugural ceremony at which the accompanying illustration was obtained, was performed by the Governor-General of New Zealand, Lord Bledisloe, accompanied by the chairman of the Auckland Electric Power Board (Mr. W. J. Holdsworth) and other notabilities. Lord Bledisloe described the installation of the new set as "a veritable triumph of promptitude, resourcefulness and knowledgeable interest in the public welfare."

This set was also designed and built by the General Electric Co., Ltd., at its works at Witton and Erith. The turbine is the eighth Fraser & Chalmers machine supplied, their total capacity being 35,500 kW. It is of the multi-stage impulse-type designed to run at a speed of 3,000 r.p.m. Steam conditions are 210 lb. per sq. in., and 590° F. Steam can be bled from two stages for feed-water heating.

The 6,600-V alternator is provided with an enclosed cooling system, with a high efficiency fan at each end of the rotor. A cooler absorbs the heat from the air before it is re-circulated through the machine.

The new generating plant brings the capacity of this power station up to 41,000 kW, an increase of 33,000 kW since 1922.

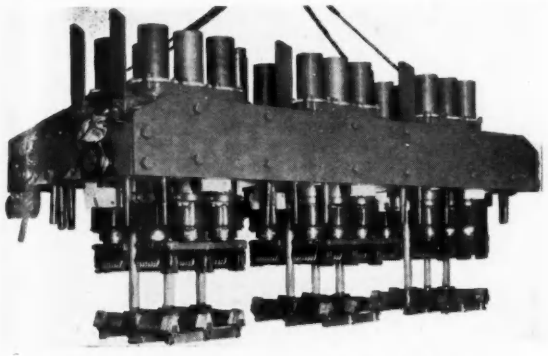
A Portable Cathode-ray Tube

The General Electric Co. of America has produced a new cathode-ray tube which is so small, complete with all its equipment, that it can be carried with ease and used on a small table. Although operating at 70,000 V, it uses ordinary 110-V house supply, a small semi-fluid immersed transformer producing the necessary high voltage. The tube itself is only 12 in. long overall, with a bulb 3½ in. in diameter. The "window" through which the cathode rays escape into the air is aluminium foil, the central portion of which has its thickness reduced over a number of small areas to less than a half of a thousandth of an inch. The tube is mounted on a transformer case, measuring 8 in. high, 6 in. wide, and 10 in. long. With the tube in place for operation, the overall dimensions are only 15 in. in height, 7 in. in width, and 14 in. in length. The other case, containing the meters, resistances, and controls, measures 10½ in. by 8¼ in. by 8¾ in. overall. Both cases are provided with carrying handles. It is possible to place the object being rayed within a small fraction of an inch from the window, so that the loss in air, which would be very apparent if the window were recessed, is negligible. The tube is designed to handle a tenth of a milliampère at the rated voltage of 70,000.

New Heavy-current Round-tank Switchgear

Three separate circuit breakers in parallel, with multiple contacts

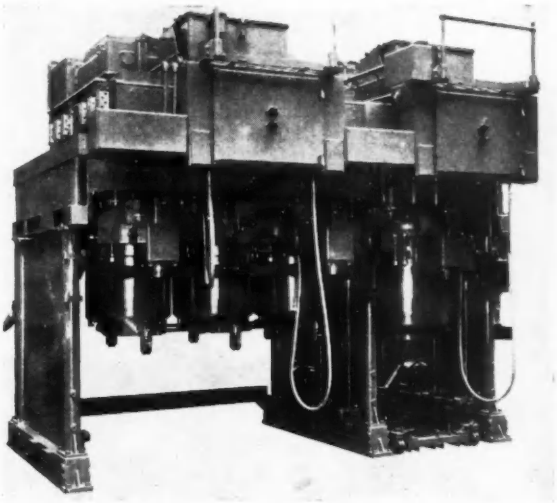
A RECENT development by Messrs. Ferguson, Pailin, Ltd., of the round-tank circuit breaker described in the ELECTRICAL REVIEW of October 31st, 1930, p. 750, is a line of heavy-duty units designed for service on large-capacity systems, of which the two VTR28/3 (vertical isolation; transfer selection; round tank; 28-in. diameter; three-breaker combination) units, 6,600 V., 4,000 A., ordered for the Central Electricity Board by Messrs. Merz and McLellan for in-



Top Portion of Combined Circuit-breaker Unit

stallation at Islington are representative. The essential features of the design, to permit dealing with the very heavy currents, are an arrangement of three separate round-tank breakers, one breaker functioning for each phase, and the adoption of multiple contacts. Each pair of contacts on the "Islington" unit will carry 1,800 A. The temperature rise is in accordance with the B.E.S.A. standard.

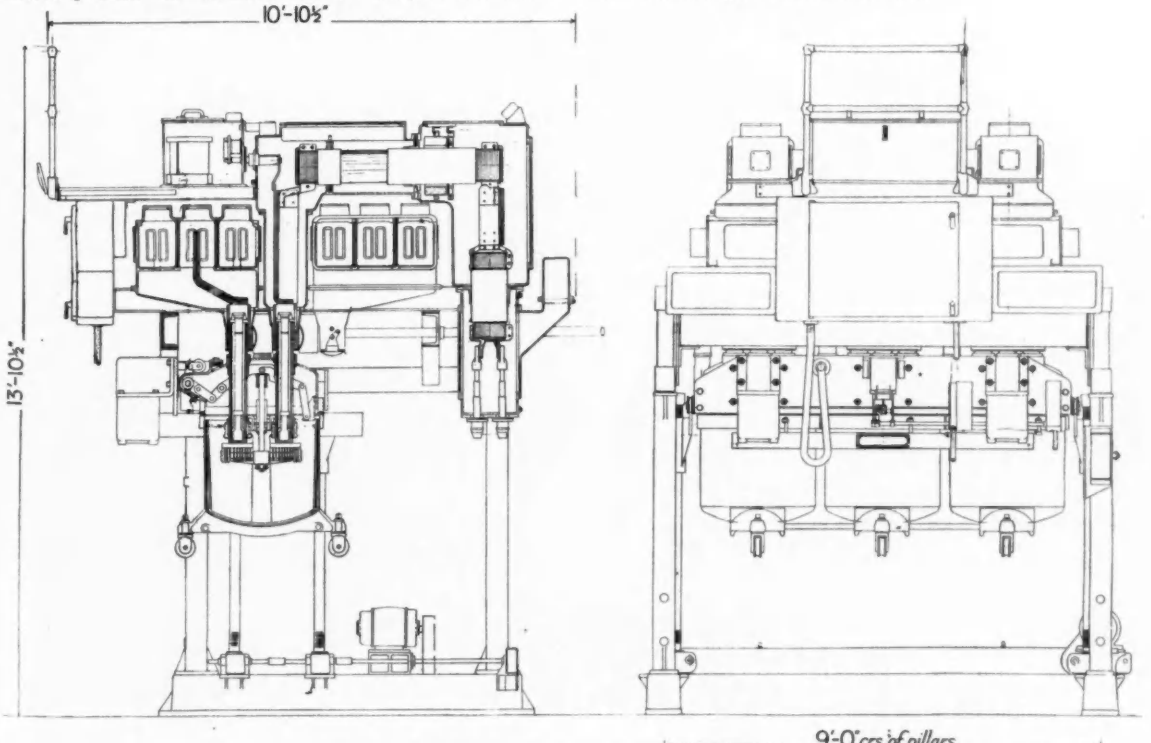
The three separate breakers are solidly coupled together by a shaft of ample section, and the complete switch is closed electrically by dual solenoids wired in parallel. The tripping of the switch is controlled by a single coil mounted on the centre phase, which operates a common trip bar between two solenoids. The phases being alike, it is possible to dismantle the separate breakers for interchanging. Any one of the breakers can also be used on a single-breaker unit of lower capacity. The unit is of duplicate bus-bar design, and is arranged for the transfer method of selection. In the isolated position the breakers can be wheeled backwards or forwards. Contact inspection can be effected with the breakers in the isolated position and the tanks lowered to the floor. Four lifting screws common to the lift or isolating motor result in perfect registration of the isolating contacts. The c.b. plugs and sockets are of the flexible self-aligning type, and by machined dowels are registered to $\frac{1}{16}$in. Each breaker is fitted with its own vent pipe which is pebble filled to prevent oil throw and is carried outside the building. All the various positions of the breakers are controlled by mechanical devices so arranged as to operate the raising and lowering



Single-tank and Three-tank Switches in One Unit

motor, and in this way multiple wiring for the raising and lowering circuit is reduced to a minimum. The bus-bar compound-filled chambers are of the usual rectangular design, the bars are of ample size to carry the 4,000 A., and the phases are separated by earthed metal shields.

The circuit side of the unit is also phase separated, each circuit being complete in its own chamber. The tubular conducters are insulated in "Bakelite." Ring-type current transformers are employed, with large-section secondaries to deal with heavy short-circuit currents.



Detailed Arrangement of the "Islington" Switch

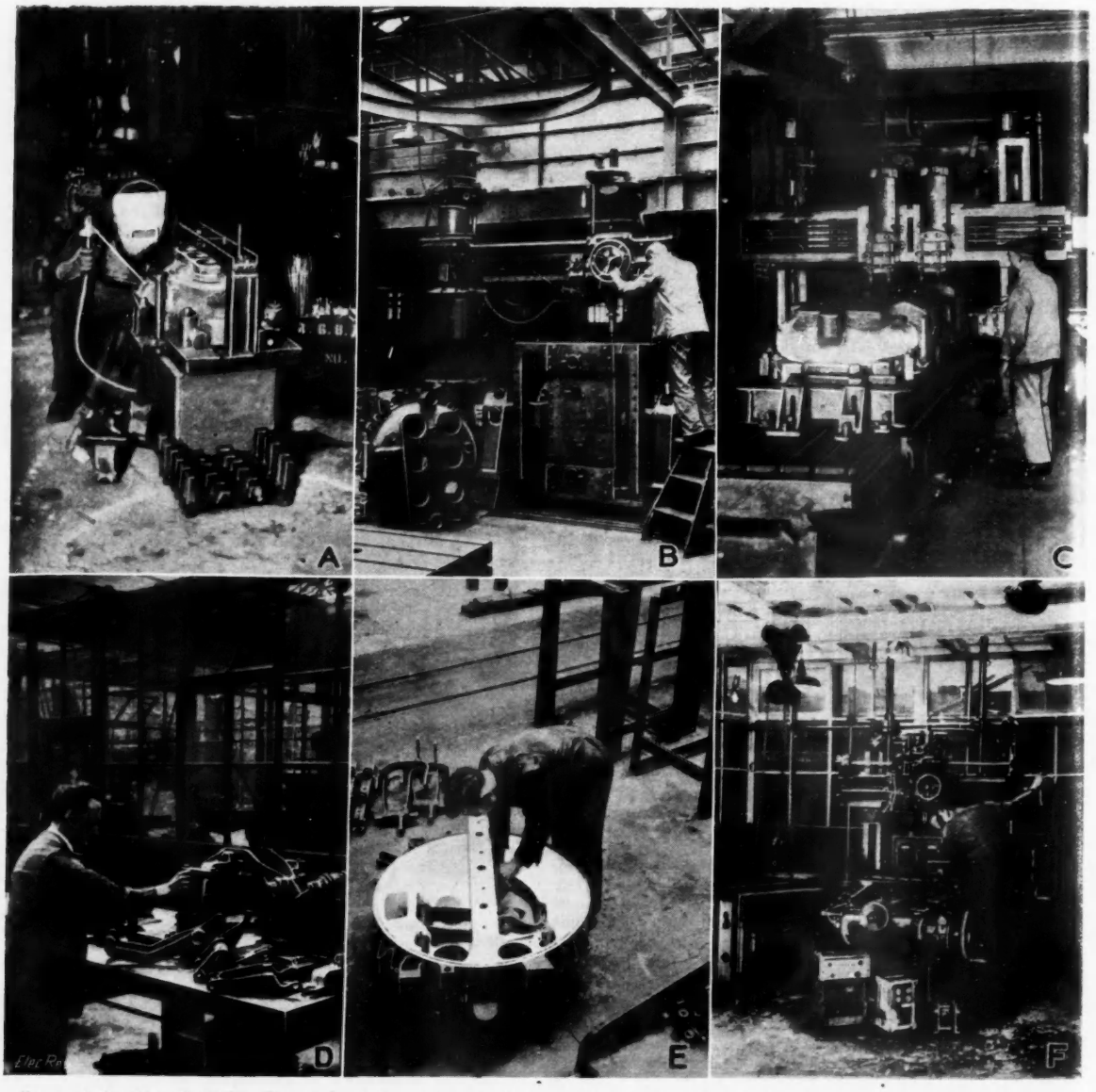
For the "Islington" unit multiple cables are used per phase; a feature of the design is a disconnecting link box above the cable box, the link box being oil filled and so designed that any cable can be completely isolated. If there is a breakdown on one cable it can be repaired while the others are in service, or if the full current is not required at first extra cables can be fitted later. All the connections and transformers are easily accessible; simply by draining out the oil and removing a bolted on cover the whole internal connections are exposed. The chambers are hermetically sealed, and ample air spaces are allowed above the oil for expansion. The potential transformers are housed in a common tank which plugs into the circuit connection chamber with a horizontal motion. Simple butt spring-loaded contacts are employed for the potential transformers. The p.t. chamber is not hermetically sealed, but it is fitted with an air-drying breather to which attention is required only once every six months. The whole gear is fully interlocked, with a minimum of moving parts. All the auxiliary switches are mounted on the fixed portion and are operated by dual Bowden wire.

Observations made of the manufacturing processes for the equipment in question apply generally to the round-tank switchgear as a whole. It was interesting to note the preponderance of the round-tank switchgear of all sizes in the works, and also that fabrication is now being applied to some of the largest switch equipment of all classes. The manufacture is carried out on an interchanging basis, involving an elaborate system of jigs and machine tools. Each breaker movement is subjected to sub-assembly in a master jig, according to its size, with the result that any one movement can be taken at random and assembled into any completed switch top or dome. The top-plate is a fabricated structure in which all the holes are drilled and machined in one setting in the most up-to-date drilling machines.

After final assembly of the mechanism the circuit breaker does not leave the department in which it was made until it has passed through a master jig representing the framework of the unit common to the type of gear to which the switch is allocated. The unit portion is also manufactured largely on the fabricated-steel principle, and numerous fixtures and jigs are again used to cover all the processes. The parts are assembled in units on sections on a master base plate and tested for accuracy of alignment, reliability of structure, and appearance. All the top members are also assembled on fixtures representing the breaker plugged in to its final position, and the overhead chambers are set in such a way to ensure uniform and reliable assembly on to the frames or side members of the actual unit. All oil-containing vessels are tested to withstand pressures which are in all cases equal to the required duty of the apparatus.

All the jigs and fixtures are specially designed and manufactured to cover the numerous processes, for which purpose there are available some excellent examples of precision machine tools. Of these we found a boring machine of Swiss make of particular interest, especially because the high degree of accuracy is finally dependent upon the uneven edge of a horizontal strip of metal, the undulations providing the necessary compensation for the inaccuracies of the major controlling screw of the machine.

The opportunity to inspect some of the tested round-tank circuit breakers referred to in our previous articles was pleasing indeed, and it was also interesting to see similar breakers awaiting despatch for like treatment.



Some of the Manufacturing Processes of Round-tank Switchgear: (A) Dome-welding; (B) Drilling Dome in Rotating Jig; (C) Machining C.B. Top-plate; (D) Assembly of Movement in Top-plate to Represent Completed Dome; (E) Assembly of Mechanism in Cover; (F) Jig-boring Machine in Special Room

News from Birmingham

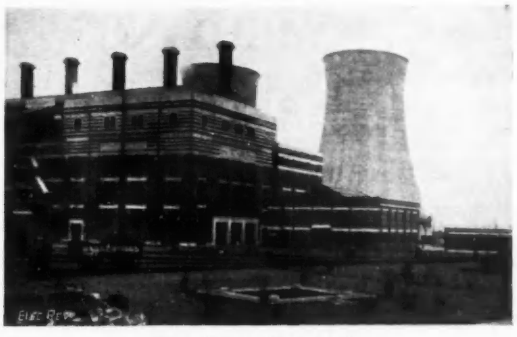
Hams Hall works costs: commercial and technical developments: rapid growth of the Electric Supply Department

DURING a visit to the Birmingham Electric Supply Department last week, it was pleasing to find available for the first time the essential works costs for the Hams Hall generating station for the six months ended June 30th last. The overall thermal efficiency of the station, based on kWh generated, is given as 22.80 per cent. The anticipated "overall maximum theoretical efficiency" of the station in 1929 (ELECTRICAL REVIEW, November 8th, p. 793), was 23.3 per cent., so that it can safely be said that the adoption of pulverised fuel on the unit system, using low-grade fuel, was justified. The cost of fuel per kWh generated, including coal and ash handling, works out at 0.082d., while the total works costs per kWh generated and sent out are 0.113d. and 0.119d., respectively.

The generating-plant capacity of the station is now 90,000 kW, in three 30,000-kW turbo-alternators, two generating at 25 cycles, and one at 50 cycles, and the total energy generated was 67,544,180 kWh, so that the station load factor for the six months was 27 per cent. The most interesting point bearing on these figures is that the station depends on cooling towers for its condensing water, and Mr. F. Forrest, M.I.E.E., city electrical engineer, asks whether any riverside station in Great Britain can beat the figures.

Turbine Room at Hams Hall

Main overhead lines are now in course of construction from Hams Hall southward for the rural area supply, following the grid line route. For the first few miles of the lines Rutter poles are employed, and then the construction is standard practice. The main distribution is at 11,000 V, three-phase, with ordinary copper conductors. Spur lines are mostly in "Copperweld" (for the same pressure), but in some cases "Crapo" galvanised steel is used. It is the experience of the Department that the galvanising does not flake off.



The Hams Hall Station

For the l.p. distribution in the more congested districts, underground three-phase, four-conductor cables are used, while in the outlying districts four-wire overhead lines are principally used. For from 100 kVA up to 200 kVA kiosks are used at the transforming centres, while for below 100 kVA outdoor transformers at ground level are employed, controlled by English Electric oil-break switch-fuses. Single-phase pole transformers of from 5 to 50 kVA are being adopted, with "Empire" switch-fuse control. The undertaking is hopeful of soon having mains in every village in the rural area. Mains are now being extended to Temple Balsam and other rural areas,w hile Bickenhill, Whitacre, etc., are under contemplation.

Having regard to the total number of consumers, the Department claims to be now the largest provincial undertaking in the country. The 1,784 consumers connected last month bring the total up to over 111,300. The output for the last quarter, ended September, represented over 8 per cent. increase on the figure for the corresponding period of last year. In these times of industrial depression it comes as a pleasant surprise to hear of 4,422 h.p. being connected in one month—that was October's contribution. And the domestic load is making still greater headway. It has more than doubled in the past three years, and the present connected load is 64,860 kW.

Several large consumers are now being, or have just been, connected to the system, including an ice rink in Summer Hill Road (200 kW); 2,600 houses of the Housing Estate Co.; and sixty-four houses at the Cranmore Estate, Shirley. During last year 182 miles of l.p. cables were laid, and the consumption per head of population is now 346 kWh per annum.

A new showroom was opened in July at Hansworth, making four in all, and another is being built at King's Heath. During last year 13,000 accounts were paid at the showrooms, which, it is estimated, were visited by 50,000 consumers. The undertaking has a big stand at the present Building Trades Exhibition in the City, and it is getting busy for its displays at the National Trades Exhibition, the British Industries Fair, and the Brighter Homes Exhibition.

Up to the present nearly 9,000 consumers have been provided with installations on easy-payment terms. The capital expenditure now exceeds £11,600,000, and the revenue last year was £1,899,757.

Electricity and Shipping

Lloyd's Register records advances in propulsion and welding

THE annual report of Lloyd's Register shows that during 1930-31 there has been a marked extension of the use of electricity for propulsion purposes and also for driving auxiliary engine-room and deck machinery.

The Peninsular and Oriental Steam Navigation Co.'s 22,500-ton twin-screw *Strathaird* and *Strathnaver*, the Union Steamship Co. of New Zealand's 6,152-ton *Rangatira*, and Furness, Withy & Co.'s 22,400-ton *Monarch of Bermuda*, are all steam turbo-electrically propelled vessels, built by Vickers-Armstrongs, Ltd.; the first three named were electrically equipped by the British Thomson-Houston Co., Ltd., and the fourth by the General Electric Co., Ltd.

During the period under review the Diesel-electric drive was applied to five new ships, of 17,280 tons. Two of them were the oil tankers, *Winkler* (6,927 tons) and *Permian* (8,955 tons), built by Scotts' Shipbuilding & Engineering Co., Ltd., for the Atlantic Oil Shipping Company. The propelling machinery of these vessels consists of four Diesel engines driving four main electric generators supplying current to one double-unit main propelling motor, and in each case the Diesel engines were constructed by the Société d'Electricité et de Mécanique (Procédés Thomson-Houston & Carels), of Ghent, and the electrical equipment by the British Thomson-Houston Co., Ltd.

Attention is also drawn to an interesting innovation in yacht construction which occurred during the year. The launch *Quasi-Arc* was built under the supervision of the Society's surveyors by Saunders-Roe, Ltd., of East Cowes. She is built of steel, electrically welded, and has been classed in the Yacht Register as "A1—electrically welded—experimental—subject to annual survey."

The application of electric welding to ship construction is a development which, in recent years, has become of increasing importance. Serious consideration of this method, as applied to the structure of ships, dates from the later years of the war, and in 1918 an extensive series of tests on the strength and ductility of electric welds was carried out under the ægis of this Society. As a result, tentative regulations for the application of electric-arc welding to ship construction were issued by the Committee so far back as 1919, the first regulations of this kind to be published. The Committee was also closely associated in the design of the steamer *Shean* ex *Fullagar*, which was the first seagoing vessel constructed by means of electric welding, to the complete exclusion of riveting. This vessel was built under the Society's special survey in 1920, and holds the Society's classification.

Recognising the importance of ensuring that only thoroughly sound systems of welding be employed, the Committee also adopted a series of tests and requirements to be applied to any system of welding for which recognition was desired as complying with the standard laid down. A list of the systems which have complied with these requirements is published in the Society's rules, and the value attaching to the Committee's recognition is shown by the number of applications, both from home and abroad, which have been received for inclusion in this list. In the construction of new vessels, the number of those parts of the hull which fulfil a function of secondary structural importance and for which the Committee has approved the adoption of this process, has steadily increased. The Committee has kept closely in touch, from the earliest stages, with the progress which has been made. Data has been, and is being, collected, and special investigations have been made so that the rapidly expanding use of welding in the construction of merchant ships may develop along sound and scientific lines.

MEETINGS AND DISCUSSIONS

A Review of Current Topics and Opinions at the Institutions

The Development of Power Companies

THE inaugural address of Capt. J. M. Donaldson, M.C., the new president of the INSTITUTION OF ELECTRICAL ENGINEERS, deals with the pioneer work of electricity supply. It is divided into three periods, in the first of which, covering the introduction of electric light, the business was highly speculative. Even before the 1914-18 war the financial position of the industry as a whole was not particularly satisfactory. The present sound financial position of supply undertakings has only recently been attained.

The second section relates to the work of the power companies, when the use of extra high voltages enabled a much greater area to be supplied from a single generating station and the use of electric power was becoming an important factor, not only in industrial districts, but also in a good many rural areas nearby. When considering the prosperity of company undertakings now, one has to bear in mind the "lean" years which preceded the present state of mild prosperity and stability. The true power company is one which has perpetual powers.

A Wide Territory

Their areas of supply follow closely the densely populated industrial districts; the total territory covered is 24,303 sq. miles, the smallest individual area being 140 sq. miles, and the largest 4,085 sq. miles. In 1930 the maximum demand made on the nineteen companies amounted to 699,452 kW, and twenty-three of their power stations have been "selected" for the national grid scheme. The total plant capacity was 1,388,568 kW, the length of feeder mains was 8,120 miles, and the number of transformer stations 4,769. The total energy sold was 2,237,975,062 kWh, at an average price of 0.76d. per kWh, and the capital expenditure amounted to £49,156,044.

The third part of the address deals with the building up of the "capillary" network of the country. The length of feeder mains and the number of points from which supplies can be obtained are a measure of the accessibility of the product which the undertakings have to sell, and the number of kWh sold is the real criterion of utility. It must not be thought that the companies have contented themselves merely with bulk supplies, since in their areas a very large amount of penetration into rural districts has been carried out, and this is going on at an increasingly rapid rate; it was the companies which initiated this side of the business, although much credit has been bestowed elsewhere.

The possibility of interlinking organisations of this character is illustrated by the interconnections between the North Metropolitan E.P.S. Co. and its neighbours, to their mutual advantage, sometimes on a reciprocal basis and sometimes not, with the idea of economising plant. It would have been quite feasible for the power companies acting together to have achieved much the same object as will be obtained by the national grid, but by a different and cheaper method, if it had been possible to persuade people to do of their own accord what would be to their undoubted benefit.

The Companies' Grid

The electrical "capillary" system must be many times the length of the main arterial grid lines if we are to derive the full benefits which the national system can ultimately provide. In the two territories north of London in which the president is himself interested, the total mileage of feeder mains is 965 and the total number of supply points is 482, as compared with 100 miles and six step-down points in the case of the grid system adjoining.

Throughout the country some 26,393 sq. miles of rural territory is being developed by 50 different undertakings; the length of high-voltage mains is 4,405 miles and the number of transforming stations is 3,477; the energy sold in 1930 totalled 351,876,510 kWh. These figures may be added to those of the power companies to obtain a fair idea of the extent to which electricity has penetrated the country, as distinct from the larger towns; overhead lines are now becoming so common that nobody takes much notice of them.

Calling a Halt to Interference

In conclusion the president remarks that the industry has been for a long time the plaything of the legislation, and suggests that the time has come for it to be left alone to work out its own salvation. The solution is such a simple one that he almost hesitates to mention it; it is that those concerns—whether they be run by public or private enterprise—which have, by their records, shown their ability to handle large areas and have, of necessity, accumulated valuable experience and a trained and experienced staff, should be entrusted with wider powers. The process which is too often adopted at present bears a close resemblance to that of the small child who anxiously digs up his garden from time to time to see how the seeds are growing. The seeds of electricity supply are firmly and properly planted and can safely be left to fructify and increase if left to themselves.

What's in a Name?

IN his address at Glasgow as chairman of the Scottish Centre of the INSTITUTION OF ELECTRICAL ENGINEERS, on October 20th, Prof. G. W. O. Howe outlined the evolution during the last hundred years of the nomenclature of the main fundamental conceptions of electrical engineering.

There were at present considerable differences of opinion about the meanings to be assigned to certain well-established terms, the names to be assigned to certain phenomena and conceptions, the relative merits of different units and systems of units, and the allocation of names to these units. Many of the terms commonly employed in electrical engineering were introduced by Faraday; in some cases he used them in the same sense as they were employed to-day, but in others they were used in an entirely different sense.

The B.A. Standards Committee

The demand for distinctive and convenient names for the various electrical units came from practical men, those engaged in the design and calculation of telegraph cables. They found it very inconvenient to express their measurements in so many units of resistance, or units of current, and at the British Association meeting at Manchester in 1861 Charles Bright and Latimer Clark read a paper in which names were suggested for the principal electrical units. That paper led to the appointment of the Electrical Standards Committee of the British Association, which, after six years of strenuous work, produced the system of units now adopted internationally, although not with exactly the same names. A long appendix by Clerk Maxwell and Fleeming Jenkin to the B.A. Committee's 1863 report did much to crystallise electrical nomenclature.

In the naming of units, as in other fields of international rivalry, the home team had a certain advantage. Oliver Heaviside referred to the decision to apply the name ampère to the unit of current as a remarkable step. He objected to it as being too long, and feared that it would be shortened to amp., which he thought was not nice (his fear was justified). "Better make it père," said Heaviside, "for was not Ampère the father of electrodynamics?" In 1885 Heaviside advocated very short names, such as dyne and erg; he not only suggested mac, bob, tom, and dick as all being very good names for units, but pointed out with his characteristically subtle humour that if mac was given max for the plural it would appeal widely internationally.

The B.E.S.A. Glossary

In 1926 the British Engineering Standards Association published a "Glossary of Terms used in Electrical Engineering," but unfortunately the sections dealing with the fundamental terms of electrical technology were very confused and in no way representative of generally accepted usage. Cause and effect in magnetic and electric phenomena were so mixed up together that many of the definitions were unintelligible. The book should never have been issued with the authority of the B.E.S.A.

There had been some dissatisfaction expressed regarding the mutilation of the names of great scientists in making names for units. Farad and volt were two examples, but the most undignified and ugly procedure was the reversal of a name to designate a reciprocal. The unit of conductance was a case in point, and the German National Committee, in suggesting the name of Siemens for this unit, protested against the use of the word mho. It was believed, however, that "half a mho" was not entirely unknown as a unit of time.

Regulations and their Enforcement

RULES and regulations framed with the object of preserving the safety of users of electricity were the subjects chosen by Mr. G. Scott Ram for his address as president of the ASSOCIATION OF SUPERVISING ELECTRICAL ENGINEERS in London on October 20th. He said that the 1882 rules of the Phœnix Fire Office were the first of their kind to be drawn up and the 38 editions were regarded as the standard code. In the same year the Society of Telegraph Engineers produced 21 rules covering much the same ground, but in greater detail; they are now in the ninth edition and are the accepted standard (I.E.E.), though there is evidence of the need for a simpler, or abridged, code.

The Electric Lighting Acts were originally administered by the Board of Trade, which was required to make regulations for the safety of the public to be issued with each Provisional Order made for a public supply; it also had to confirm any by-laws made by local authorities. The 1905 revision permitted a medium pressure of supply for certain purposes, if the consumer undertook to comply with certain conditions as to wiring, earthing, etc., thus obviating the special approval of

the Board of Trade in each case. There was, however, no obligation on the supply authority to see that the conditions were actually complied with by the consumer; the supply authority's responsibility practically ended at the "consumer's terminals."

Unorthodox "Rules"

Although the 1882 Act provided that any local authority might make by-laws for further securing safety, provided such by-laws were confirmed by the Board of Trade, it appears that no such by-laws have ever been made or approved. Nevertheless, nearly every local authority giving a supply, and some companies, have issued wiring rules of their own, which they have imposed on their innocent consumers, such rules being, of course, *ultra vires*. Thus there were numerous codes of rules with which the wiring contractor had to make himself acquainted. Fortunately now practically all the supply authorities have adopted the Institution's rules in place of their own individual codes, but, except in the case of West Ham, they have no legal powers to enforce observance on their consumers.

In spite of the absence of legal powers much can be, and has been, done by supply authorities, when they are so minded, to see that the consumer's installation is proper and safe. Some of them, in fact, take a fatherly interest in their consumers' installations and in the long run this form of "service" pays; but there are cases, mostly amongst companies, in which no interest or supervision whatever appears to be taken, with the result that most atrociously bad and dangerous work is connected up.

At the present time, apart from "factory" premises and places of public entertainment, e.g., in the London area, neither the supply undertaking or any Government Department has any powers of inspection or enforcement of rules as regards consumers' installations. The result is that the "jerry" wireman continues to flourish. A large proportion of the thousands of new houses erected since the war in the suburbs of London were wired by the builders or their incompetent sub-contractors in the cheapest and worst manner. It would be greatly to the advantage of all concerned if some authority could control the wiring of new houses.

Revised Regulations Foreshadowed

The coming into force of the Home Office Factory Regulations (1909-10) necessitated further modification of the Board of Trade regulations and a new edition was issued, which is now known as the "Regulations of the Electricity Commissioners," they having taken over the duties of the Board of Trade as regards electricity supply. It is an open secret that the Commissioners have had in hand a complete revision of their regulations for some considerable time.

The Central Board's Economic Problems

SOME of the commercial and economic aspects of the operations of the Central Electricity Board are discussed by Mr. J. Eccles in a paper read last week before the Manchester Technical Group of the ELECTRICAL POWER ENGINEERS' ASSOCIATION. He deals with methods of ascertaining the cost of production tariff and of determining the grid tariff, remarking that it is one of the anomalies of the recent De-rating Act that all public electricity supply authorities, including the Central Board, were excluded from participation in the abatements in local rates made available to productive industrial undertakings. This is a matter of considerable moment to the industry, but apparently one for which there is no redress.

Where Savings Can be Made

A very large percentage of the total output to-day is generated in stations of good technical performance, and any further saving which may be effected in this direction, though definite, is fairly limited. Capital charges are the item to which we must turn if any substantial reduction is to be made in the consumers' tariff, and until the capital charge per kWh sold is reduced, only minor reductions in tariffs will be economically justifiable.

It is as unfortunate, therefore, as it is unavoidable that the initial operations of the Board involve increased capital expenditure, though under the provisions of the Act the charge on this capital need not be met out of revenue for the first five years. The position as regards capital charges will therefore not be materially different for some years, and it is largely due to the method adopted in meeting these charges that any immediate benefit will be derived from the 1926 Act.

The Boldest Stroke

While there is no immediate prospect of reducing the total capital charges on the industry, the charge per kWh sold, which is the important item, may be reduced by increasing the sale of energy, provided there is a corresponding increase in the load factor of the supply. Only by mutual co-operation and strenuous endeavour will the best interests of the industry be served. The paramount need of the moment is an increase in the volume of energy used and in the diversity of its applications, and this may in some measure be brought about by the intensified activities of sales and consumers' engineers. In this respect the declaration of a grid tariff which is constant over a period of years is probably the boldest stroke of policy yet made by the Board.

The Training and Status of Engineers

THE selection and training of the men who will become our future engineers are at the present time of exceptional importance, said Mr. R. Alan Thwaites in his address as chairman of the INSTITUTION OF CIVIL ENGINEERS, YORKSHIRE ASSOCIATION, yesterday (Thursday). In the new phase of international competition it will only be possible for us to re-establish our position if our technical skill and methods of production transcend those of our rivals. The solution of our problems in every branch of our manufacturing trades is mainly the task of engineers and technicians, whose training and mental equipment must be of the highest order if the results of their labour are to produce that high degree of efficiency which is the key to success.

British engineers taught the world, and British workshops largely equipped the world for industry. We have thus been the means of producing our own most formidable competitors, and it can only be by dint of strenuous effort to keep ourselves ahead of all others in technical knowledge and equipment, and by a wide understanding of world affairs that we can hope to hold our own.

The final conclusion is that, although legislation could to some extent help to establish the status of the qualified engineer by attaching to him some form of label to enable him to be readily distinguished from those who are unqualified, yet in the ultimate outcome it is mainly a matter for the engineer himself. By displaying outstanding ability in his duties and in public he must merit that high status which will assuredly not long be withheld.

A Variety of Views

AT the South Wales Branch of the ASSOCIATION OF MINING ELECTRICAL ENGINEERS at Cardiff, Major W. Roberts, this year's chairman, chose as the subject of his address "The Transportation of Coal *v.* the Transmission of Electricity." His conclusion was that a good case could be made out for electrical transmission, and he believed that the big reduction in the cost of electrical plant and equipment during the past few years was one reason why a different answer could be found to this question to-day than was the case three years ago. If the progress estimated by the Electricity Commissioners was to be attained, it would be necessary for the Central Board to supply not only the consumers which the municipalities and power companies had at present, but also the large users who, at present, generated their own electricity. The collieries were predominant in this class in South Wales, and it surely was farcical to transport coal from a colliery to a large town, and then retransmit the energy which the colliery required to mine the coal over the same route that the raw fuel had traversed.

* * *

ONE of the methods of rendering marine reciprocating steam plant more economical is to install an exhaust turbine, the additional power so generated being transmitted to the propeller shaft directly by mechanical gearing or electric motors (Bauer-Wach and "Metrovick" systems). Another method has been described by Mr. Alrick Bjorklünd to the INSTITUTE OF FUEL.

In order to save space and initial outlay, reduce moving parts, and simplify maintenance and service, the Lindholmen-Motala Co. prefers to super-heat electrically the steam between the high- and intermediate-pressure cylinders of the main propulsion engine. Electricity is produced by an exhaust turbo-generator, 90 per cent. of the d.c. so produced being used for superheating and the remainder for driving electrical auxiliaries and for lighting when at sea. An auxiliary dynamo is used when the ship is in port.

The *s.s. Trione*, a 2,800-ton, 10-knot, 800-i.h.p. cargo vessel, has been equipped with an electric super-heater of 168 elements, each of 1 kW at 220 volts, round which the steam flows. They consist of heat-resisting wire supported on steatite discs and arranged in two nests, which can be easily withdrawn.

* * *

AT a joint meeting of the INSTITUTE OF FUEL and eighteen other societies and institutions Dr. W. R. Ormandy dealt with "Coal, Smokeless Fuel, and Oil from the National Standpoint." He pointed out the possibilities of converting coal into oil, concluding that hydrogenation at the present prices of coal and oil would not pay.

Mr. E. R. Wilkinson (representing the Central Electricity Board), commenting on the reduction in coal consumption between 1913 and 1929, namely, from 287 to 257 million tons, said that 20 million tons related to export and bunker coal, in the electrical industry, however, the consumption had increased by 100 per cent. during the period in question. Between 1924 and 1929 electric power sales had been increased by 75 per cent., but there was still considerable leeway to be made up.

STEADY development, without radical changes, is recorded in the ILLUMINATING ENGINEERING SOCIETY'S annual report on progress. A substantial increase in the number of lamps produced and more complete standardisation of types have again aided a diminution in cost. The demand for lamps of comparatively low wattage with very concentrated filaments has led to the development of "coiled-coil" filament lamps. This mode of construction is difficult to apply on a commercial basis, but a manufacturing process has been perfected.

The number of electric lamps used per head of population in Great Britain during the year was 1.05, an increase of 17 per cent., and 61.2 per cent. of lamps sold were of the gasfilled type, as compared with 53 per cent. for the previous year. Standardisation of electrical pressure has also had a material influence on the demand for lamps.

For signalling there is a tendency on railways to change from the use of a double-lens combination to the searchlight type, the advantages claimed being smaller wattage lamps for the same axial candle-power, greater beam spread, and avoidance of phantoms. For road traffic signals a reflector-lens system has been developed.

* * *

SPEAKERS discussing Mr. P. R. Coursey's paper on the methods of constructing static condensers and some of their applications to electric power circuits at the INSTITUTION OF ENGINEERING INSPECTION, made it clear that for power-factor correction such apparatus soon paid for itself. Automatic control introduced complications which were not really necessary, and increased maintenance costs. With a kVA tariff the use of condensers was essential.

To avoid quick deterioration the better types were sealed to exclude atmospheric moisture. Impregnated-paper dielectric fulfilled most requirements for operating frequencies below 10,000 cycles, above which mica was preferable. For p.f. correcting condensers an a.c. over-voltage test made such a heavy demand that it was difficult to carry out; a d.c. test was simpler and equally useful.

* * *

A LUNCHEON of the BATTI-WALLAHS' SOCIETY was held on October 22nd at the Hotel Metropole, London, Mr. J. S. Highfield, the president, taking the chair. A very interesting address was given by the Rt. Hon. Lord Meston, K.C.S.I., the principal guest, who gave a vivid picture of the conditions of life among the peasantry in India, and indicated some of the apparently insuperable racial difficulties which confront the Round Table Conference. Sir Hugo Hirst, Bart., is to speak at the next luncheon of the society, the date of which will be announced later.

* * *

AT a dinner following the opening ceremony of the Faraday Celebrations of the RUGBY ENGINEERING SOCIETY on October 22nd, Mr. F. Hodges was the guest of honour, and in a very impressive speech he dealt primarily with the intensive electrification of industry generally as the necessary second phase in national power development. He said that it was calculated that British industry was under-electrified to such a degree that more than three and a half million h.p. of electric motors could still be introduced. Industry was likely soon to have the chance of entering on a new period of activity resulting from improved international competitive conditions, but it would not be able to re-equip itself adequately owing to the depletion of its financial resources by the prolonged trade depression. To meet such peculiar and unfortunate conditions Mr. Hodges advocated the formation of an extensive financial organisation, or organisations, to be at the disposal of the great electrical manufacturing companies for the work in question.

Mr. H. N. Sporborg, M.I.E.E., director and chief engineer, B.T.-H. Co., quoted one instance of how the electrical industry was paying its debt by rendering assistance to science. A telescope was being made to-day which would have eight times the collecting power of the largest existing telescope in the world, and it would employ a mirror of fused quartz produced by industrial electrical treatment.

* * *

PROFESSOR E. Taylor Jones, Glasgow University, in a centenary address on "The Life and Work of James Clerk Maxwell" to the ROYAL PHILOSOPHICAL SOCIETY OF GLASGOW on October 22nd, said that the study of the thermodynamics of radiation had brought forth the quantum theory, one of the great discoveries of the present century. The invention of "wireless" was another development arising out of Maxwell's equations, which remained, even to-day when the tendency was to abolish the ether altogether as a substance, firmly established as the most concise expression of the laws of electromagnetic action.

* * *

IN describing the various processes involved in the manufacture of standard steel conduit, used for enclosing electrical wiring, before the EDINBURGH ELECTRICAL SOCIETY, Mr. H. F. McLoughlin thought the development of the ideal tube would be from rolled steel strip rather than the process of drawing solid bar. The difficulties experienced in welding steel strip, however, would make people turn to rolling. Arc-welding, or electric high-resistance welding, was a means of solving that difficult problem, and satisfactory progress had been made in this direction during the last few years.

* * *

SELECTED problems relating to the coal industry are dealt with in Mr. B. Pochobradsky's INSTITUTE OF FUEL paper in which he points out that during the last ten years the electrical energy obtained from one ton of coal has increased by 78 per cent., the total kWh generated by 180 per cent., and the total coal consumption by 57 per cent. About 6,000 million kWh was generated in 1930 at the rate of 1,360 kWh per ton of coal, which indicates a further possibility of improving the utilisation of coal energy in its conversion to electrical energy.

No one wants electricity for its own sake, but by making power, heat, and light available at steadily diminishing prices electricity has increased its output, and at the same time has contributed to the development of other industries.

Book Reviews

Electricity and Magnetism. By VINCENT C. POOR. Pp.ix+183; illustrated. London: Chapman and Hall, Ltd. Price 11s. net.

This is a mathematical monograph on the subject and the author is Associate Professor of Mathematics at the University of Michigan. In a short introduction and five chapters he deals with the subject under the headings of vector analysis, electrostatics, magnetism and polarised dielectrics, current electricity, the dynamics of the electric current, the electron theory and the application of special relativity theory to electricity.

After a very careful study of the work we find ourselves at something of a loss to understand its precise purpose. Most, if not all, of what is included appears to us to have been done before and in much more detail, so that the present volume is more an introductory summary of the subject than anything else. As the author himself says, the book "should appeal to a very select class of readers, the physicist, the mathematician and the electrical engineer who wish to orient themselves quickly in electrical theory." That being so, we think the contents are hardly likely to be sufficiently satisfying to those to whom it is addressed, although the author includes a very useful list of references towards which a more intensive study may be directed. A notable omission from this list is Steinmetz's books on "Relativity and Space."

So far as the quality of the work is concerned we have nothing but praise, although the author exhibits perhaps an undue tendency towards the philosophical. A more determined effort to weld theory and practice should result in a volume highly acceptable to a much wider circle of readers. May we hope the author will act upon this suggestion? The format of the book is irreproachable.

Direct Current Machine Design. By A. W. HIRST. Pp.xii+175; figs. 76. London: Blackie and Son, Ltd. Price 10s. net.

This book, which deals only with the design of shunt and compound wound machines of normal or enclosed ventilated construction, betrays at once the hand of the practical designer. It is addressed primarily to students who require some general knowledge of machine design, but who do not intend to specialise in the subject. As Dr. Robertson says in the foreword, it will not be without its uses to the actual designer. To teachers of machine design the book should prove invaluable.

The chapter headings, which are as follows, give a good indication of the scope of the work:—Insulation and insulating materials; temperature rise; ventilation; rating of electrical machines; construction; output equation and main dimensions; the magnetic circuit and field windings; the armature, interpoles and commutator, efficiency; procedure in design; design of a compound motor; examples of d.c. machine designing. Examples are set after each chapter and solutions are given at the end of the work. Excellent sectional drawings are included showing practical modern mechanical design details.

As a minor criticism, we should like to have seen examples of the mechanics involved in the design of the larger machines, that is, the calculations of the stresses set up in shafts, bearings, commutators armatures and yokes, for this important aspect of electrical machine design is ignored far too often. Otherwise, within the limits to which the author has confined himself, the book is thoroughly sound and essentially practical and it may be recommended without any reservation. The volume is well produced and we commend the reasonable price asked for it.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Canvass the Country

I have read in your last issue the leader "Canvass the Country" with more than ordinary interest, and also a paragraph "An Urgent Call," and wish to compliment you on stressing Mr. Atkinson's statement at the last meeting of sales and publicity managers, to the fact that unless supply authorities proceed to put their houses in order so that the demand can grow more rapidly, the Central Electricity Board will have to take the matter up and itself obtain such powers as are necessary to push the sales of current. This may come about sooner than is expected; in fact, it may surprise a number of your readers, if the writer maintains that this will have to be, particularly with regard to municipal supply.

My reason for stating this is that in many towns gas interests are represented on the Council, and although there is no direct representation on the Electricity Committees, they have so many friends on such Committees as to retard to a great extent the full exploitation of electricity supply, therefore it is not altogether the fault of officials of many undertakings.

October 23rd, 1931. PROTECTION.

I have just finished reading your article urging a national canvass on behalf of electrical supply, but some alteration of the terms of supply will be necessary before a canvass could have much success.

I live three and a half miles from a large northern town and twelve miles from the Manchester (Barton) super-power station. The supply cable passes my land, but as my house stands about 130 yards from the road I must pay about £40 for the privilege of using the supply.

Naturally I find it better to continue with my own lighting set, which was installed two years ago after inquiries had been made regarding the prospects of a supply. In what way would a canvasser approach me?

REGINALD BARKER.

Trafford Park, Manchester, *October 23rd*, 1931.

Still the Boiling Plate

The boiling plate of the small domestic cooker is an interesting piece of apparatus, because it is, in most cases, so inefficient that time is bound to produce new designs with radical changes. I have an all-electric house and I fully endorse the editorial remarks in the ELECTRICAL REVIEW of October 16th, page 562.

The electric cooker must satisfy the consumer on all of the following points to be favourably regarded by the public:—Very fine control of the heat supply; very rapid raising of saucepan temperature; elimination as far as possible of thermal capacity losses in the stove parts; a high degree of thermal conductivity; and choice of heater size to suit large or small saucepans.

I believe that the ultimate domestic electric cooker will have exposed heating elements, probably toroids of small diameter, at non-shock voltage. Each cooker will contain a transformer for reducing the voltage. Corrosion of the elements will be overcome by the use of a nickel alloy. Heat control will be partly by switching, i.e., series-paralleling the heater halves, or cutting out a section of the heater, and partly by moving the heater nearer to or away from the saucepan bottom.

Possibly the experts, especially those who have designed the ultra-rapid new plates, will disagree with me; but do these plates satisfy all the full points I have given above?

F. L. BEST.

New Barnet, *October 24th*, 1931.

Freight

There appears to be a discrepancy in the article by a "Commercial Correspondent" on freight in the September 4th issue of the ELECTRICAL REVIEW, on a package 5 ft. by 4 ft. by 4 ft., weighing 45 cwt. D/W at 85s. per ton freight rate, which should be £9 11s. 3d. total, and not £8 10s. freight per ton as stated.

The useful method of recording shipping charges is not very clear as to what is actually meant by percentage on (*a*). If (*a*) represents the cost ex works, exclusive of packing, then the percentage on works costs to cover delivery c.i.f. would be as set out in the table below:—

To base the estimated cost of freight on the f.o.b. or works cost is not a good policy to adopt, as freight charges do not always indicate the relative cost in percentage to the f.o.b. value, and it is always best to work out the actual cost which is very simple, and occupies only a few minutes.

The variation in cost for a given article is illustrated by the case of the following boiler; the example shows the necessity for working out in each instance the actual freight charges:—

GLASGOW TO CALCUTTA.	£ s. d.
1 drum 18.5 tons M. @ 32/6	30 0 9
10 sections 22.75 tons M. @ 55/-	62 11 3
Remainder 10.75 tons M. @ 50/-	26 17 6
	119 9 6
Primage	11 18 11
Clyde dues on 22.25 tons	3 3 9
	£134 12 2

The above is for a boiler partly fabricated, the freight for a similar boiler with sections shipped loose would be:—

GLASGOW TO CALCUTTA.	£ s. d.
1 drum 18.5 tons @ 32/6	30 2 0
100 tubes 5.0 tons @ 25/-	6 5 0
Remainder 13.7 tons @ 50/-	34 5 0
	70 12 0
Primage	7 0 9
Clyde dues 22.25 tons	3 3 9
	£80 16 6

The insurance usually covers for delivery to site, and in some cases for a given specified period after arrival at site, the percentage rate therefore depends entirely upon the destination and the extent of cover required.

ANDREW W. RICHARDSON.

Calcutta, *October 3rd*, 1931.

Appointments in Ireland

In the issue of your journal for October 16th, the letter signed by "Englishman" ought to have been headed "Appointments in the Irish Free State" instead of "Appointments in Ireland," as his remarks apply to Ireland as a whole.

I should like to point out that in Northern Ireland, which is still an integral part of the United Kingdom, the conditions of all such public appointments are exactly the same as in Great Britain, and are open to all natural born British subjects.

Belfast, *October 21st*, 1931. JAMES J. HYDE.

Testimonials from Employers

I should be interested to hear if any of the younger technical readers of the ELECTRICAL REVIEW have ever experienced any trouble in the matter of obtaining testimonials from their employers, when leaving of their own accord. I have been told that it is not the custom of any departmental managers of the bigger combines to give a testimonial to the actual employé, but to tell him to submit their name. This, apparently, is owing to an agreement of the Federation which prohibits such a practice. Now I consider that such an agreement is a blot on the escutcheon of the electrical engineering profession, for most decidedly some people do obtain testimonials, thus gaining an advantage over those, of possibly better merit, who have not been fortunate in doing so. The latter, when answering an advertisement, have to state "for testimonials please apply to Mr. So and So"; this I am sure in many cases is not bothered about and the application is rejected.

I should be pleased to hear the views of other people, including also those of the older generation, who, if they had laboured under a similar handicap would not, perhaps, hold the positions they do to-day. What are we going to do about it?

October 21st, 1931. GRAD. I.E.E.

Protection from Lightning

Replying to Mr. J. H. Robinson's letter in your issue of October 23rd, I maintain that it is advisable that all electrical installations connected to overhead systems should be provided with efficient means of protection against lightning, etc. The protection of the line itself is not important, but there is the possibility of damage to the meter and other apparatus connected to the system, and these must be protected.

It has been proved that surges can be imposed on a low-voltage distribution circuit through the step-down transformer

Goods and value (*a*).	Destination.	Packing. £ s. d.	Freight £ s. d.	Insurance. £ s. d.	Sundry charges. £ s. d.	Total. £ s. d.	Percentage on (*a*).
House-lighting set with accumulators £275	Rotterdam	23 0 0	7 10 0	1 3 0	0 6 0	31 19 0	11.6
Small generating set £120	Bilbao	4 10 0	7 15 0	1 8 0	0 13 0	14 6 0	11.9
Five h.p. engine £50	Madras	2 0 0	1 13 0	0 6 0	0 9 0	4 8 0	8.8

and the percentage to cover the cost of freight, insurance, sundry charges, but excluding packing, would be:—

Goods and value (*a*).	Destination.	Freight. £ s. d.	Insurance. £ s. d.	Sundry charges. £ s. d.	Total. £ s. d.	Percentage on (*a*).
House-lighting set with accumulators £275	Rotterdam	7 10 0	1 3 0	0 6 0	8 19 0	3.2
Small generating set £120	Bilbao	7 15 0	1 8 0	0 13 0	9 16 0	8.1
Five h.p. engine £50	Madras	1 13 0	0 6 0	0 9 0	2 8 0	4.8

from the high-voltage transmission system, and that the effect of surges on insulation is cumulative, i.e., a number of small successive surges are quite as dangerous to insulation as one large surge; therefore it is evident that some means should be used to eliminate them.

I understand that a new type of surge absorber for distribution systems up to 600 V has been developed by one large manufacturer which is a modification of the larger type made by the same firm for transmission systems. This type of absorber was, I believe, designed to meet the demand of customers in tropical countries, where surges in the distribution circuits are a definite menace due to the frequency and severity of lightning storms. E. B. CHADWICK.

Manchester, *October 24th*, 1931.

Power-plug Points

I note with interest the remarks of Mr. F. L. Best in the ELECTRICAL REVIEW of October 23rd regarding the position of power-plug points.

In recommending that heavy-duty plugs should be placed waist high, he has apparently lost sight of the following important considerations:—

(1) The flexible lead must of necessity trail from the plug to the floor and on to the apparatus, and is both unsightly and dangerous.

(2) The plug provides still more temptation to children as it is always in sight.

(3) If placed in what appears to be a suitable position in the first place, the plug is bound to be in the way of some piece of furniture when a rearrangement is made.

(4) The suggestion of Mr. Best would definitely negative one of the main selling points inasmuch as it would necessitate the chasing out of walls and making good.

It should be noted that a certain amount of discretion is necessary in the selection of the plugs to be used; the most practical type is provided with a foot-switch, when the only stooping required is to push in the plug which entails no more exertion than putting coals on the fire. The correct position in which to install switchplugs (preferably of the sunken foot-switch type) is, in my opinion, immediately above the skirting board. Plugs for appliances to be used on the table, such as irons, toasters, etc., may be placed about three feet high provided the position of the table is definitely fixed.

No! Power plugs and wiring (flexible or otherwise) should be placed where likely to be of the most service and be as unobtrusive as possible. R. LAWTON.

Leigh, Lancs, *October 23rd*, 1931.

I do not agree with Mr. Best's contentions regarding power-plug points as stated in your issue of October 23rd on the following grounds:—

(1) These points would not be so cheap to install if taken up the wall 3 ft. instead of being fixed on the skirting board.

(2) A hanging flex from the wall is more in the way as regards small tables, etc. At that height it is much more likely to attract a child's attention and is easier of approach.

(3) If the wall is panelled out, a plug in one of the panels, even if sunk, is very unsightly. P. E. POOLE.

Wolverhampton, *October 24th*, 1931.

Charges to Isolated Consumers

Mr. Wilson, in your issue of October 16th, raised the problem that all who are dealing with rural distribution have to face, that is to say, what terms should be offered to an isolated consumer for whom a heavy outlay is involved but whose requirements and means are limited.

The question is: What are the minimum terms necessary in order to avoid a loss to the undertaking? A 20 per cent. return on the outlay is a useful general rule, but it is not always applicable. What is necessary is an amount to cover the capital charges on the distribution, plus the cost of the electricity, including general charges such as rates and taxes, and management.

The generation cost, if taken from the grid or from a modern power station, will be of the order of £4 per kW, plus 0.2d. per kWh. This for a 30 per cent. load factor gives 0.576d. per kWh, and adding 20 per cent. for transmission and transformer losses, we get the cost delivered to the consumer at, say, 0.7d. per kWh. For management and other expenses, 0.3d. should be sufficient, so that 1d. per kWh will cover everything except the capital charges on the transmission lines and the local expenditure on transformers, low-voltage mains and services. When the tariff consists of a fixed charge and 1d. per kWh the matter is simple, as any extension can be considered sound if the fixed charge is sufficient to cover the capital charges on both transmission and local expenditure.

In supplying over a large rural area I have found that the total cost of the 11,000-V lines is just about equal to the total expenditure for transformers, low-voltage mains and services, so that if 8 per cent. is required for interest and redemption the total of the fixed charges for any particular town or village should be 16 per cent. on the local expenditure alone.

In considering extensions for special isolated consumers where a comparatively small revenue only could be obtained, I think it is sufficient if a return of 8 per cent. on the special expenditure is secured, as there is always a margin on the capacity of the transmission lines and their cost is covered by the supplies to larger places.

In the case given by Mr. Wilson, 8 per cent. on £285 or, say, £23, is required, plus 1d. per kWh. Out of the £2 obtained from each of the six cottages, 30s. each, or £9 in all, may be considered as available towards the fixed charge, which leaves £14 per annum to be paid by the farmer. This is not an excessive amount if he uses electricity for power as well as for domestic purposes, and pays only 1d. per kWh in addition. If other consumers are obtained, a reduction could only be made if the fixed charges from the new consumers exceeded 8 per cent., or, say, 10 per cent. on the extra cost involved in connecting them.

I quite agree with Mr. Wilson that guarantees are not satisfactory, and it always makes bad feeling if the consumption falls short and the consumer is asked to make up the difference. He always considers that he is paying for something he has not had.

I find it is much better to make the fixed charge sufficient to cover the capital charges on the outlay and leave the consumer free to use as much or as little as he likes.

F. M. LONG,
Norwich, *October 26th*, 1931. City Electrical Engineer.

The Price of Electricity

In the current issue of a certain weekly periodical appears an offer to "increase the prize-money of its cross-word puzzle when the number of competitors justifies the increase."

This is very much like the way in which certain authorised undertakings deal with the question of the reduction in the price of electricity. They maintain that a decrease in price can only be effected when the number of kWh sold justifies the decrease.

I would suggest that neither potential cross-word competitors nor potential consumers of electricity are attracted by such a policy; both have other alternatives which they undoubtedly use. MAN IN THE STREET.

October 26th, 1931.

Wiring Regulations

Now that the generation of electricity is passing under the control of the Central Electricity Board, is it not time to standardise the use everywhere of the I.E.E. Wiring Regulations?

Some of the supply undertakings now draw up stringent regulations of their own, which they do not enforce, and many of such regulations are absurd.

There is considerable room for improvement in the method of installing iron-clad switchgear and cut-outs. Thus, terminals should be capable of carrying the maximum rated load without heat being conducted to the cables. All poles of a three-phase supply should be interlocked and all portable leads should be protected throughout by an efficiently earthed metal covering. The views of others would be welcomed.

J. PRESSWELL.

Walthamstow, E.17, *October 26th*, 1931.

The Electric Drive in Factories

I read with interest Mr. R. H. Green's letter in your issue of October 23rd, criticising my article, which, by the way, was not intended as a proof of practical experience in installing oil engines; in fact, my activities have hitherto been employed in their displacement.

The article put forward the average case for the electric drive in factories, and not the best possible case, as assumed by Mr. Green. I cannot understand his reference to power factor, rectification or kW charge in this connection. It was definitely stated in the article that the price paid for electrical energy was assumed to be 1½d. per kWh. The amount of energy represented by one kWh is not affected in any way by power factor.

Mr. Green reminds us that he finds great difficulty in selling oil engines of about the power mentioned (presumably in face of powerful competition) unless the figure of 0.5 lb. of fuel per b.h.p. hour on full load could be reduced to 0.40 or 0.45 lb. In any case, he will see from the middle of the first column of page 528 that I ignored these purely theoretical figures, and, for the purpose of comparison, assumed that a 70 h.p. engine consumed about thirty tons of fuel oil per annum of 2,400 working hours, which figures were confirmed by me from a most reliable source ten minutes before I wrote the article and not ten years, as he suggests.

It is difficult to appreciate why brief reference to a certain type of oil engine (introduced in, I believe, 1908) should be proof positive of entire ignorance of present-day oil-engine practice.

I cannot reply to the last paragraph of Mr. Green's letter as this is merely a statement of opinion, and he does not offer any proofs in substantiation thereof. W. P. CONLY.

Southampton, *October 26th*, 1931.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Portable Lighting Units

The "TYPERLITE" Co., 86, Cannon Street, E.C.4, is now marketing some novel forms of portable lighting units for use in workshops, drawing offices, etc. One range includes portable forms of "Typerlite" standards assembled from components and designed to dispense with the use of trailing flexible cords. Each has fitted on to the bottom of the stem an iron-cased three-pin plug, so that the fitting can be directly plugged into a metal-cased socket. Plugging-in operates an automatic switch contained in the socket base, and at the same time earths the fitting. When once inserted the standard can be firmly held into position by a screwed locking ring. The plug bases are supplied in either surface or flush patterns.

New "Typerlites": Left, Portable Plug-in Standard; Above, Heavy Wall Bracket

An extra-heavy wall bracket, with a steel protected reinforced flexible arm and fitted with an Admiralty type knuckle joint and Home Office pattern push-bar holder, carries a specially designed swing bracket which can be attached to a wall over a work bench, or alternatively, it is supplied in the form of an extension to a heavy floor standard. This forms an excellent lighting unit for use in machine shops, drawing offices, and other places where it is essential to be readily able to project the light instantaneously in any direction.

All these British-made fittings are finished in black enamel with steel or bronze parts, and are designed so that the projections of the brackets and the heights of the floor standards can be altered at will.

New and Improved Irons

The "Jacem" iron produced by MESSRS. RD. JOHNSON CLAPHAM & MORRIS, LTD., 107, Upper Thames Street, E.C.4, has a unique form of element which, it is claimed, ensures that the whole of the base of the iron is heated uniformly. The ironing is done very quickly and with very low consumption of current. It is supplied for all voltages in superior nickel or blue-mottled enamel finish, is British made, and is guaranteed for five years against faults in workmanship. It is supplied with flexible lead, a connector, and an adaptor, or with three-core flexible lead and an earthing connector, but with no lampholder.

The "Challenge" iron is made and marketed by REVO ELECTRICAL CO., LTD., Britannia Works, Tividale, Tipton, Staffs, in 5- and 6-lb. sizes. The sole plate, body cover and handle stirrup are heavily nickel plated, and a capable stand is securely attached to the heel. An ebonised wooden handle provides a comfortable hold and does not carry the heat. Each iron is supplied complete with two yards of flexible lead and a connector and an adaptor.

The weights and loadings of the "Sunco" iron recently introduced by SUN ELECTRICAL CO., LTD., 118 and 120, Charing Cross Road, W.C.2, are 4½ lb. and 350 W. A specially beaded element is contained in a groove in the base plate, so that more heat is conveyed to the toe of the iron. The iron is heavily nickelled, is fitted with a thumb rest, and contains at the back a flat metal clip which holds the wire guard fixed on the end of the connector from the former, thus preventing excessive strain on the end of the connector.

Self-cleaning Air Filter

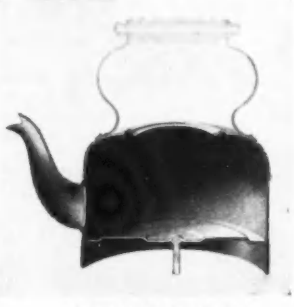
The recently introduced "Ventex" self-cleaning air filter is a natural outcome of the "Ventex" filter, manufactured by OZONAIR, LTD., Ozonair House, St. Leonard Street, S.W.1. It is designed to overcome the disability and labour experienced in the cleaning operation of all viscous-type air filters, especially the larger equipments. A number of specially corrugated plates spaced uniformly apart are held rigidly in a frame, and the essential difference in construction between the two types lies in the manner in which the plates are assembled. In the ordinary "Ventex" the plates are assembled to lie horizontally one above the other, whilst in the self-cleaning type the plates, which are of larger size, are fixed vertically. The panels are made in varying heights and widths, so that different building dimensions can be dealt with. By combinations of standard panels there are available 153 different sizes, the capacities varying from 3,000 cu. ft. per min. to 26,000 cu. ft. per min. The basis on which these capacities are calculated is 600 cu. ft. per min. per sq. ft. of the filtering surface, at which velocity the water gauge resistance is 0.3 in. The construction is robust, the material used being mainly mild steel of ample thickness. The filter proper is composed of tinplate of extra strength assembled on stout steel rods.

Self-cleaning "Ventex" Air Filter

The fluid in the tank at the base of the filter panel is pumped into the top container from which it flows through a series of small holes or passages down the surface of the corrugated plates of the filter. In its passage down the plates the fluid carries with it the whole of the dust particles, etc., collected by the filter in its previous use. The time required for cleaning may vary from 10 to 30 minutes or so, according to the height of the filter and the amount of collected dirt to be removed from the plates. The standard pump is motor driven and is fitted complete with controlling and starting gear.

A Solid-drawn Kettle

In this, the "Eddo" kettle, supplied by MESSRS. H. G. MOSELEY & Co., LTD., Hospital Street, Birmingham, instead of the separate soldered-in base, the walls and bottom are drawn in one piece. In place of the usual soldered-in element fixing pins, only one central pin is fixed to the under side of the bottom, and there are no pierced holes or soldered connections in or around the base. A British solid refractory ring element is fitted. Owing to its construction, it is possible to leave the kettle empty in circuit for hours on end without leakage or damage to the element, but, if desired, a patent automatic safety device can be supplied. The makers give purchasers a two-years' guarantee, and the kettle is available in 2½- and 3½-pint sizes, loaded at 850 W.



The "Eddo" Kettle

The "Jacem," "Challenge," and "Sunco" Irons

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

The Australian Customs Tariff

The annual report of the Commonwealth Tariff Board deals with a number of matters vitally affecting the interests of British manufacturers. One outstanding recommendation is that a systematic revision of the tariff should be undertaken in order to ascertain to what extent "natural" industry can be resuscitated by a reduction of duties on essential plant or materials. "If uneconomic industries are being maintained at too great a cost it must tend to retard other more natural industries, whether primary or secondary." It is considered that excessive duties are dangerous for the following reasons:—They may shelter industry unduly and tend to lack of efficiency or to undue profit; there is undoubted evidence of the danger of encouraging the establishment of plant over and above what is actually justified by the market available; excessive duties tend also to encourage the local production of certain goods, the manufacture of which in Australia under existing conditions is so costly as to make production uneconomic; further, prohibitive duties tend seriously to disrupt trade generally. The community in general, the Board considers, is best served by the imposition of a duty sufficient to enable an efficient manufacturer to develop his business and secure the trade. The Board accuses manufacturers of using the tariff to extort excessive profits from the public, and states that the profits made by some local manufacturers were such as to influence the Board in recommending against any general increase in the duties applying to a number of classes of goods, including brass bars, extruded sections, rods and tubes; telegraph and telephone cables (lead-covered); copper bars, rods, etc.; and dry batteries and dry cells.

Hull Contractors Struck Off

The Hull Corporation Electricity Committee has struck two firms off its list of approved electrical contractors under the assisted wiring scheme for alleged contravention of regulations. In one case it was alleged that an undue number of apprentices had been employed, and in the other the foreign-made cable was used in installing an electric cooker, whereas British-made cable was specified in the contract.

American Electrical Interests in France

It is announced that the American General Electric Co. has acquired 50,000 shares in the French Compagnie Générale d'Électricité, or shares of the nominal value of 25,000,000 fr. out of the total share capital of 130,000,000 fr. The Compagnie Générale, which is interested in the generating and supply business, as well as in manufacturing, has hitherto remained free from foreign influence.

Birmingham Building Trades Exhibition

The Birmingham Corporation Electricity Supply Department is represented by an admirably equipped stand at the Birmingham Building Trades Exhibition (October 20th to 31st), at Bingley Hall, Birmingham. It includes electric lighting, heating and cooking apparatus, water heaters, refrigerators, wash boilers and washing machines, as well as a very comprehensive selection of domestic labour-saving appliances. Several of the wood-working machinery exhibits are electrically driven.

Marconi-B.T.H. Patent Extended

In the Chancery Division on October 26th, Mr. Justice Luxmoore had before him an application by Marconi's Wireless Telegraph Co., Ltd., and the British Thomson-Houston Co., Ltd., for an extension of time for their patent No. 15,237 of 1915 covering improvements in and relating to wireless signalling apparatus.

Mr. Tookey, for the applicants, said the invention related particularly to the transmission of wireless messages. The patent was granted to the British Thomson-Houston Co. in 1915, and was owned by that company throughout the war. His case was that there was an entire loss of opportunity to develop the patent owing to war work on which the company was engaged. The patent was assigned to the Marconi Co. in 1919, and from that time onwards considerable use had been made of it.

Counsel read an affidavit in support of the application by Mr. John Gray, manager of the Patent Department of the British Thomson-Houston Co., in which it was stated that the invention was for modulating the amplitude of oscillation produced by a valve generator by varying the potential applied to the anode.

The Comptroller-General of Patents, did not oppose the application, and His Lordship granted an extension of four years to October 27th, 1935.

Wages in the Cable-making Industry

The Joint Industrial Council for the Electrical Cable-Making Industry informs us that the October 1st cost-of-living index figure is 45 per cent. above the 1914 level and that there will therefore be no alteration in wages on the third pay-day in November.

Canadian Dumping Duty on British Goods

Information has been received from His Majesty's Senior Trade Commissioner at Montreal that an Order-in-Council was issued on October 24th which provides that dumping duty will be payable on United Kingdom goods only when the current value of the £ sterling is below its value as officially fixed for dumping duty purposes. This official value will be fixed on the first and sixteenth of each month. These provisions remain in force until December 31st unless previously modified. The official value until October 31st is fixed at £1=$4.40. The dumping duty will be payable only to the extent to which the current exchange value of the £, compared with the Canadian dollar, is below that figure. In any event dumping duty is levied only on goods of a class or kind made or produced in Canada. Ordinary customs duty will continue to be assessed on a value for duty calculated in Canadian dollars on the par basis of £1=$4.86⅔.

Stockport Shop-lighting Competition

At the request of the borough electrical engineer of Stockport (Mr. R. Lee) an inspection of the shops entered for the lighting competition was recently carried out by Mr. R. C. Hawkins, North-West Area Officer of the British Electrical Development Association, who awarded the prizes as follows:—Shop interiors: 1st, Messrs. Clarkes; 2nd, Mr. W. L. Quale. Shop windows and exteriors: 1st, Messrs. G. L. Halsall & Son; 2nd, Messrs. Jackson's, Ltd. In his report on the competition Mr. Hawkins stated that in both classes the general standard was high. Electrical shops, which had better facilities for obtaining the necessary equipment, were handicapped, and although none was successful in winning a prize, they were highly commended, not only for the displays entered, but also for giving a lead to other traders.

Power Companies' Progress

A striking leaflet has been produced by the Incorporated Association of Electric Power Companies, illustrating the amazing strides made in the electricity supply industry. Through a policy of consolidation of supply over wide areas the Association now comprises fifteen companies, and its members produce approximately one quarter of the electrical energy consumed by the nation, selling it at an average price of ¾d. per kWh. At the head of the leaflet is a picture symbolising Faraday throwing open the doors of the world to the manifold uses of electricity.

Palestine to Buy British Plant

A *Reuter* message from Jerusalem states that with a view to establishing closer commercial relations with British producers of raw materials and machinery, the Palestine Manufacturers' Association has decided to send a special delegation of three prominent Jewish industrialists to England in order to confer with the Federation of British Industries and Chambers of Commerce. It is reported that local manufacturers now desire to purchase their principal raw material and machinery requirements in England, instead of in Germany, Czecho-Slovakia, and other European countries as hitherto, in view of the favourable exchange.

New International Aluminium Cartel

An International Aluminium Cartel with a share capital of thirty-five million Swiss francs, has been formed in Basle. It includes French, British, German, Swiss, and Canadian producers, and it also possesses works in Norway. The object of the company, which has been named the Alliance Aluminium Co., Ltd., is to develop and extend the aluminium supply. Power is taken to increase the capital to sixty-five million Swiss francs.—*Reuter* (Basle).

The World's Platinum Output

As a result of an agreement reached between the important producers of platinum throughout the world, a new English company, entitled "Consolidated Platinums, Ltd.," has been formed to buy and resell virtually all the new platinum production originating in the U.S.S.R., Canada, South Africa, and Colombia, constituting the major portion of the world's output of this precious metal. One of the new company's principal functions will be to promote the use of platinum through an intensive research and market development programme and to facilitate co-operation between distributors, producers, and consumers in this effort. Sales of the metal which the company will buy will be carried out through existing distributors and dealers, and there will thus be no change in present distribution methods.

New Showrooms at Brighton

In connection with the Brighton Corporation electricity undertaking some new showrooms are in course of construction, but it is understood that these will not be completed for at least another twelve months. In the meantime, however, the Electricity Department has equipped temporary showrooms at 88, Church Street, Brighton, where a special

point will be made of demonstrating the uses of electricity for cooking and other domestic purposes. This will also enable the numerous inquiries which are being received to be satisfactorily dealt with. Cookery lectures are to be given at intervals in the showrooms. The new rooms were opened on October 21st by Councillor E. Marsh, chairman of the Lighting Committee.

Book Notices

"The Solution of Triangles," E. N. Digweed, Wh.Ex., A.M.I.Mech.E. Pp. 49, figs. 38. London: Draughtsman Publishing Co., Ltd. Price 2s. net.—This pamphlet, the title of which is self-explanatory, is one of the series published by the National Technical Sub-Committee of the Association of Engineering and Shipbuilding Draughtsmen. Following definitions, forty-two problems are dealt with.

"Smoke Abatement Handbook." First edition. Pp. 16+32. Manchester: National Smoke Abatement Society.—This publication, the first of its kind, has been compiled to furnish all those who are interested in smoke abatement, and who may be called upon to speak or write upon it, with reliable data and a quantity of up-to-date information on all aspects of the problem that hitherto has not been available in small compass and in one publication. It is intended to be a reference not a text book, and it is hoped also that the various articles and statistics will serve to stimulate consideration of the subject and so increase interest in a problem that is at last becoming recognised as being of first-class economic and hygienic importance. The handbook is sold at 6d. a copy, post free, with reduced prices for quantities.

"Robert Bosch and His Work," by C. Matschoss. Pp. vii+126; figs. 124. Berlin: VDI-Verlag, G.m.b.H. Price Rm. 8. This work has been issued at the instance of the Association of German Engineers on the occasion of the seventieth birthday of the man who has done so much towards the development of electrical ignition for the internal-combustion engine. It gives a brief account of his life and of his manifold industrial and social activities.

"Automobile Repair," by J. C. Wright. Second edition. Pp. viii+312; figs. 164. London: Chapman & Hall, Ltd. Price 18s. net.

"Essentials of Electricity," by W. H. Timbie. Second edition. Pp. xi+306; figs. 262. London: Chapman & Hall, Ltd. Price 12s. net.

"The Preparation, Selection and Distribution of Coal." Pp. viii+182; illustrated. Issued jointly by the Institute of Fuel and the Coal Trade Luncheon Club.

Lectures at Motherwell

MR. W. D. BRASSINGTON, borough electrical engineer at Motherwell and Wishaw, informs us that during last week a series of five lectures were given to various organisations in the town. The lectures were well attended by an appreciative public. The subjects of the lectures embraced house lighting, cooking, heating and electric water heating. The lighting of factories and shop windows was also dealt with. The various types of apparatus used in the home were demonstrated with gratifying results.

A "Magicoal" Fire Display

The accompanying illustration is an excellent example of the standard window displays of "Magicoal" electric fires which Berry's Electric, Ltd., is now arranging throughout the country. The display illustrated is at the Portsmouth Corporation Electricity Department's showrooms, and the ample dimensions of the show-window have enabled the company to install two built-in fires—one a "Magiclog" fire—in addition to a variety of designs of its portable fires.

Irish Free State Electrical Imports

A very quiet tone continues to exist in the electrical trade in the Irish Free State. The value of imports of machinery and cognate apparatus during August last amounted to £53,179, bringing up the total for the first eight months of the year to £426,429, a decrease of £163,782, or about 27½ per cent., as compared with the corresponding period of 1930. Details of the eight months' imports are appended:—

	First eight months. 1930.	1931.
	£	£
Electrical machinery	201,919	126,097
Electric wires and cables	117,111	62,382
Electric lamps and parts	59,780	38,891
Radio sets and parts	53,585	59,358
Other electrical goods	132,473	124,756
Copper wire	25,343	14,945
Totals	£590,211	£426,429

It will be noticed that radio goods constitute the only item showing an increase.

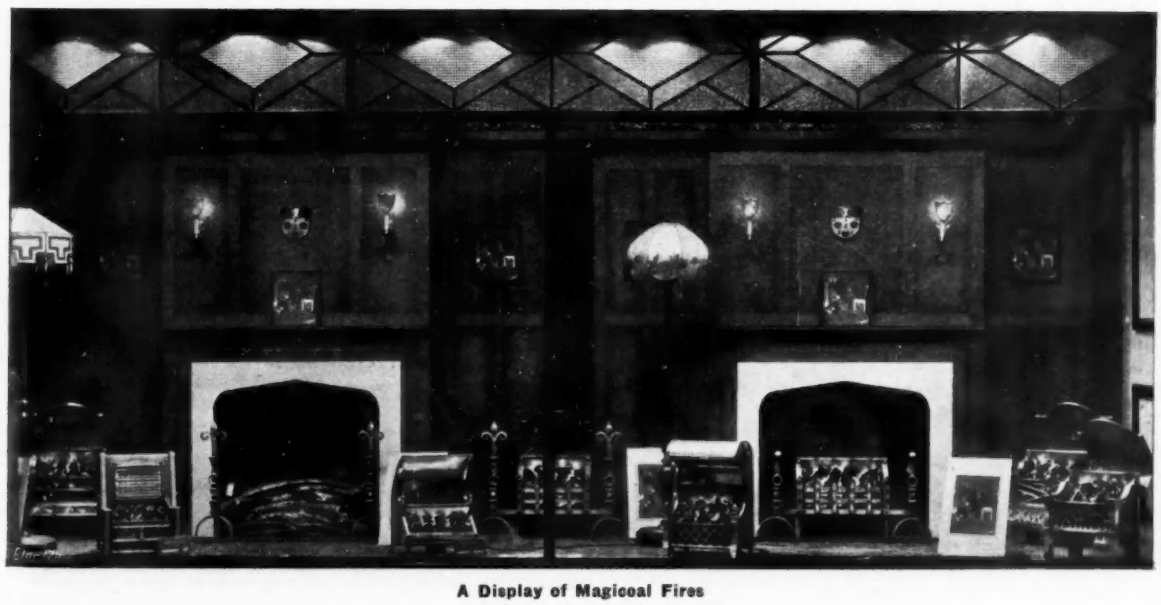
Overseas Trade: Volume and Values

The *Board of Trade Journal*, in an article dealing with the volume of the overseas trade of the United Kingdom, gives a comparison between the import and export trade of the first nine months of 1924, and the trade of the corresponding period of 1931, as revalued on the basis of the average values shown by the records of the earlier period. This shows that for the first nine months of the current year the value of imports of electrical goods and apparatus totalled £3,878,000, and of machinery, £10,618,000, as compared with £2,168,000 and £7,752,000 respectively in 1924. The respective values in 1931, estimated at the average values in January-September, 1924, were £6,059,000 and £11,204,000, or (1924=100) 64.0 and 94.8. The quantities (1924=100) were, respectively, 279.5 and 144.5. As regards exports, the value of electrical goods and apparatus for January-September, 1931, was £5,800,000 (£7,213,000 in 1924), and of machinery £24,308,000 (£32,563,000). The respective average values (1924=100) were 87.9 and 104.3, while the quantities were 91.4 and 71.5.

Permanent Floodlighting Installations

Being of dark-coloured stone, the dome of the Nottingham Council House presents considerable difficulties to effective floodlighting, and the illuminating engineering department of the Edison Swan Electric Co., Ltd., is therefore to be congratulated on the success of the installation recently carried out there. The installation, which is permanent, consists of 112 1,000-W floodlight projectors, and the average intensity of the light on the stonework as recorded by a lumeter reaches the very satisfactory figure of 60 foot-candles.

The installation of floodlighting equipment at the Civic Buildings, Cardiff, which comprise the City Hall, the Law Courts, and the National Museum of Wales, has recently been completed. The Civic Buildings are situated on a roomy site at Cathays Park in the centre of the city, and as their frontages are in line they lend themselves admirably to floodlighting effects. Illumination has been provided for the south front of each of the buildings and for the four sides of the clock tower of the City Hall. The installation at the City Hall was provided by the General Electric Co., Ltd., and comprises thirty-five units with a total consumption of 24.8 kW. Siemens Electric Lamps & Supplies, Ltd., was responsible for the equipment at the Law Courts, which consists of fourteen wide



A Display of Magicoal Fires

angle projectors for the frontage and two concentrating rectangular beam projectors for the tower over the Law Courts entrance. The capacity of the entire equipment is 16 kW. The National Museum of Wales is lighted by Ediswan equipment and consists of thirty-two units with a capacity of 21 kW. The whole of the installation work was carried out by the Cardiff Corporation Electricity Department. The installation is a permanent one and will be put into use from time to time as occasion demands.

Trade Announcements

Messrs. WOLF & MORGAN, LTD., inform us that their business in refrigerator components, oil burners, etc., will in future be carried on by REFRIGERATOR COMPONENTS, LTD., a new company, particulars of which appeared in our last issue, page 645. Messrs. Wolf & Morgan, Ltd., propose to concentrate upon the electrical side of their business, viz., electric motors from 1/20 h.p. upwards.

Messrs. CLEGG, HITCHCOCK & Co., have moved to more commodious premises at 33, James' Street, Liverpool. The telegraphic address and telephone numbers remain unchanged.

The Birmingham branch of MESSRS. CROMPTON PARKINSON, LTD., has been moved to larger premises at 33, Newhall Street, The telephone number is unchanged.

MR. F. L. COOPER, formerly with Messrs. G. R. Barrett & Son, Canterbury, has commenced business at West Ealing, W., as an electrical and radio engineer.

MR. BERTRAM LAKEMAN has recently taken over the electrical business of Messrs. Williams, Gammon & Co., Ltd., 26, Upper Northgate Street, Chester.

Social Events

There was a large gathering on October 22nd at the Holborn Baths on the occasion of the annual swimming gala of the Standard Telephones & Cables Athletic and Social Club. Much friendly rivalry was shown in the various inter-factory contests, the ladies' and men's team races in particular (both of which were won by Woolwich) provoking much excitement. The principal individual events—the ladies' and men's three-lengths' championships—were won by Miss O. Briers and Mr. G. W. Crawford. At the conclusion of the programme the prizes were presented to the successful competitors by Mr. E. S. Byng, president of the club.

A dance was held by the G.E.C. Rowing Club at Magnet House, Kingsway, W.C., on October 16th, when there was an excellent attendance. Mr. Pugh was responsible for the organisation of the event.

Recent G.E.C. Contracts

The GENERAL ELECTRIC CO., LTD., has recently received orders for nearly 50,000 " Osram " lamps from H.M. Admiralty, Air Ministry, Office of Works, G.P.O., and War Office, and for some 25,000 from the principal railway companies. A further 20,000 have been ordered for the new liner, the *Monarch of Bermuda*, now nearing completion. The company claims that its works are capable of producing a million lamps a day, employing only Empire materials.

" Metrovick " Plant for Rotterdam

We reproduce below a photograph showing on rail ready for shipment, parts of two 42,000-kW turbo-generator sets which have been made by the Metropolitan-Vickers Electrical Co., Ltd., for Rotterdam Municipality. The order for these sets was secured against severe Continental competition. The two sets aggregate about 900 tons in weight and their transport to site has presented some interesting problems. Although the power station at Rotterdam is only a few hundred yards from the quay, it has been necessary to procure a special truck from Krupp's of Germany to carry the alternator stators, which each weigh about 70 tons. The turbines are of the two-cylinder type and run at 1,500 r.p.m. They are to operate with steam at 365 lb. superheated to 752°F., the alternators being wound for 3-phase, 50 cycles, 5,500/5,800 V, at 0.875 p.f. In addition to the turbines and alternators the condensers, evaporators, feed heaters, and auxiliaries have all been made at the company's Trafford Park Works. The illustration shows the two condenser shells, each in two parts; they are of the central flow type and will be tubed on site. On the extreme left of the picture are seen two evaporators and one of the high-pressure turbine cylinders.

New Catalogues and Lists

SIMPLEX CONDUITS, LTD., Garrison Lane, Birmingham.—List No. 1,280 dealing with industrial lighting equipment.

G.W.B. ELECTRIC FURNACES, LTD., North Road, Holloway, N.7.—A leaflet giving particulars of " Eternite " case-hardening compounds.

FERRANTI, LTD., Hollinwood, Lancs.—Lists In. 1 and In. 3, describing respectively 2½-in. instruments for a.c. and d.c. measurements and moving iron instruments.

ELECTRA, LTD. (Contracting Department to the Electric Light Insurance & Maintenance Co., Ltd.), Rupert Court, W.1.—Particulars of the company's maintenance service.

WILLIAM BEARDMORE & Co., LTD., 36, Victoria Street, S.W.1.—An illustrated booklet giving details of high-speed Diesel engines.

SIMPLEX CONDUITS, LTD., Garrison Lane, Birmingham.—A leaflet dealing with the company's new prismatic lighting unit.

BAXTER & CAUNTER, LTD., 221, Tottenham Court Road, W.1.—A catalogue of telephones and bells for houses and factories. Also a booklet on church lighting.

The BENJAMIN ELECTRIC, LTD., Tariff Road, Tottenham, N.17.—Catalogue No. 1,150, containing prices and particulars of a number of new lighting fittings.

The MARCONIPHONE CO., LTD., 210-212, Tottenham Court Road, W.1.—The October number of the " Marconiphone Mail."

The HART ACCUMULATOR CO., LTD., Marshgate Lane, Stratford, E.15.—A complete catalogue of the company's storage batteries for lighting and power installations.

TUNGSRAM ELECTRIC LAMP WORKS (GREAT BRITAIN), LTD., 72, Oxford Street, W.1.—Details of an extensive lamp sales campaign.

BULFITT & SONS, LTD., Swansea Works, Birmingham.—A booklet relating to flat-bottom utensils for use on electric hot-plates.

J. G. STATTER & Co., LTD., 16, Great George Street, Westminster, S.W.1.—Leaflets Nos. MCB/1 and 203/A1, describing respectively miniature circuit breakers and air break circuit breakers.

J. J. EASTICK & SONS, 118, Bunhill Row, E.C.1.—A leaflet dealing with " Eelex " switches, terminals, plugs, sockets and radio components. Also the October issue of the " Eelex Radio Bulletin."

SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38-39, Upper Thames Street, E.C.4.—A 76-page revised catalogue (No. 430) of electric lighting accessories.

The BRITISH THOMSON-HOUSTON CO., LTD., Rugby.—An illustrated price-list of " Mazda " lamps.

SADIA, LTD., 22, Newman Street, Oxford Street, W.1.—Leaflet No. 101, giving particulars of a new type of electrically wound time switch.

The IGRANIC ELECTRIC CO., LTD., 149, Queen Victoria Street, E.C.4.—Leaflets relating to distant stop push-buttons, automatic starting and speed regulating rheostats, capstan and winch controllers, lifting magnets, motor starters, magnetically operated brakes, etc.

M.C.L. & REPETITION, LTD., Pool Lane, Langley, Birmingham.—A catalogue of screw machine products.

Strowger Equipment for London

The AUTOMATIC TELEPHONE MANUFACTURING CO., LTD., has sent us a photograph illustrating a whole train load (about 500 tons) of automatic telephone exchange equipment in transit from the company's Strowger Works, Liverpool, to the Mayfair Exchange, London.

The contract, which actually covers three 10,000-line Strowger director exchanges, the others being the " Regent " and " Grosvenor " Exchanges, was placed by the General Post Office with the company in January last and constitutes a record order for Strowger equipment. The three exchanges, which will ultimately serve some 30,000 subscribers in the western residential area of Greater London, will be housed in a

Metropolitan-Vickers Plant leaving Trafford Park for Rotterdam

single building in Farm Street, which also provides accommodation for a fourth exchange of equivalent capacity to be added later.

Manufacture of the Strowger equipment for the Mayfair Exchange is already completed to the extent of some 70 per cent., whilst over 50 per cent. is actually packed and awaiting transport. Installation on site has commenced, and the three exchanges will be ready for service towards the end of 1932.

Bankruptcy Proceedings

J. Lazarus and M. Lazarus (trading as "Langdon's Radio"), wireless and electrical dealers, 217, Golders Green Road, N.W.—The public examination of these debtors was held on October 23rd before Mr. Registrar Mellor at the London Bankruptcy Court, the accounts showing liabilities of £388 and assets nil. J. Lazarus, who had carried on a separate business of a draper at Burnt Oak, has also filed a separate statement of affairs, with liabilities of £1,100 and no assets. M. Lazarus attributed his insolvency to lack of capital, trade depression, keen competition, and to insufficiency of profits to meet overhead charges and drawings. On the application of the Official Receiver, the examination was adjourned for the production of certain books of account.

The City Machine Co. (a firm), 198, Old Street, E.C., and 5, Brunswick Place, City Road, N., wireless and gramophone dealers.—A sitting of the London Bankruptcy Court was appointed to be held on October 21st before Mr. Registrar Warmington for the public examination of these debtors, but the Official Receiver reported that one of the partners had not yet attended under the proceedings and the sitting was adjourned until November 25th next. A joint statement of affairs has been lodged by the debtor G. Roffe, showing liabilities of £2,857 against assets valued at £490. The following are the principal creditors :—

	£		£
Batterien Elemte Fabrik	112	Oldham & Sons, Ltd.	176
Dr. Branse	100	Radio Gramophone Development Co., Ltd.	141
Fuller Accumulator Co. (1926), Ltd.	84	Radio Instruments, Ltd.	127
H. Clarke & Co. (Manchester), Ltd.	144	H. Terry & Sons	97
		C. Weydameyer & Co.	132

R. H. Chambers (trading as R. H. Chambers & Company), electrical engineer, Market Street, Dartford.—The public examination was held recently at the Court House, Eastgate, Rochester. Debtor attributed his position to "depression in trade, insufficient capital, and heavy overhead charges." He had prepared a statement of affairs which showed liabilities of £524, with assets of £350. It appeared that in December, 1928, he took a tenancy of a lock-up shop in Market Street, Dartford. In the first year the turnover was £3,668, but later the takings gradually declined. The examination was closed.

E. A. Warnes (E. A. Warnes & Co.), electrical and radio engineer, 10, Crescent Gate, Wilmslow Road, Rusholme, Manchester.—Trustee: Mr. A. T. Eaves, 47, Mosley Street, Manchester, released September 10th.

G. H. Hanson, electrical engineer, 50, Park Road, Peterborough.—Last day for receiving proofs for dividend, November 3rd. Trustee: Mr. J. L. Wilkinson, 41, Sydney Street, Cambridge, Official Receiver.

G. N. Adamson, electrical engineer, Royal Station Hotel Yard, Carnforth.—Last day for receiving proofs for dividend, November 4th. Trustee: Mr. H. Parker, 9, Cannon Street, Preston.

J. W. White, radio and electrical engineer, 32, Castledene Road, Parkstone.—First and final dividend of 1s. 10d. in the £, payable October 27th at the Official Receiver's office, Midland Bank Chambers, High Street, Southampton.

G. Burgess (Granville Burgess & Co.), electrical engineer, 27, Museum Chambers, Bury Street, London.—Application for discharge to be heard at Bankruptcy Buildings, Carey Street, W.C., on November 16th.

A. L. Grace (Avon Radio Manufacturing Co.), wireless manufacturer, Birdwell, Long Ashton.—Discharge suspended for two years until October 1st, 1933.

F. T. Johnson, electrical engineer, 60, Eltisley Avenue, Newnham, Cambridge.—First and final dividend of 1 7/16d. in the £, payable November 3rd, at the Official Receiver's office, 41, Sidney Street, Cambridge.

Company Liquidations

Economic Electric, Ltd., electrical engineers and suppliers, 10, Fitzroy Square, London, W.1, 64, London Road, and 34, Aragon Road, Twickenham.—A meeting of the creditors was held on October 23rd at the Institute of Chartered Accountants, Moorgate Place, E.C.2, when a statement of affairs prepared by Messrs. Josolyne, Miles, Page & Co., 28, King Street, Cheapside, E.C., was submitted showing total liabilities of £10,153, of which £1,359 was due to trade creditors; there was an unsecured creditor for rent for £80, whilst unsecured cash creditors' claims totalled £8,364, and directors' fees £350. The total assets amounted to £1,016, from which had to be deducted preferential claims of £51, leaving net assets of £965, or a deficiency of £9,187. It was stated that the company manufactured small electric models chiefly used by boys, and the advent of radio seriously affected the sales. The voluntary liquidation was confirmed, with Mr. Page as liquidator.

Burndept Wireless (1928), Ltd., Aerial Works, Blackheath, London, S.E.—Meetings of the creditors and shareholders of this company were held on October 23rd at Winchester House, Old Broad Street, London, E.C., when resolutions were passed by the shareholders in favour of voluntary liquidation, with Mr. E. Maloney, of Messrs. Peat, Marwick, Mitchell & Co., as liquidator. Mr. C. W. Rooke, who presided at the shareholders' meeting, stated that a receiver was appointed by the company's bankers on February 27th last. This receiver continued to carry on the business for some months in the hope of being able to dispose of it as a going concern, but being unable to find a purchaser, it became his duty to realise the assets at the best prices obtainable. The assets of the company were valued at £54,925, and after allowing for preferential claims (£4,165) and the amount due to debenture holders (£29,619), there was a surplus available for distribution amongst the creditors, subject to realisation and receiver's costs, of £21,141. At the meeting of the creditors the chairman stated that the total unsecured liabilities were £47,637. He mentioned that the company was formed at the end of August, 1928, and took over the business previously carried on by Burndept Wireless, Ltd. The new company had a successful first year, but then serious manufacturing difficulties were encountered. These difficulties resulted in the company being left at the end of the season with large stocks of finished apparatus and work in progress which could only be disposed of over a long period at a very substantial loss. The company became short of working capital and could not repay the amount due to the bank. With the exception of certain of the book debts and the buildings, plant and machinery at Aerial Works, all the assets had been disposed of by the receiver appointed by the bank. The meeting was adjourned.

Bloomsbury Wireless Co., Ltd.—Winding-up order made October 19th.

A. E. G. Electrical Co. of South Africa, Ltd.—Further supplemental dividend of 74/75d. in the £, payable on and after October 26th at the office of the Official Receiver and Liquidator, 33, Carey Street, Lincoln's Inn, W.C.

Coniston and District Electric Supply Co., Ltd.—Winding up voluntarily. Liquidator: Mr. A. E. Stringer, 31, Manor Row, Bradford.

A. Cunningham & Co. (Manchester), Ltd.—Particulars of claims by November 30th to the liquidator, Mr. F. Dook, 37, Cross Street, Manchester.

R. Roberts, Ltd.—Particulars of claims by November 20th to the liquidator, Mr. S. T. Howle, 63, Temple Row, Birmingham.

Electrical and Radio Products, Ltd.—Particulars of claims by November 15th to the liquidator, Mr. D. L. Honeyman, 9, Basinghall Street, E.C.

Batchelar & Son, Ltd.—Meeting, November 30th, at Messrs. Kennards, Ltd., North End, Croydon, to receive an account of the winding-up by the liquidator, Mr. R. O. White.

Rotor Signs, Ltd.—Winding up voluntarily. Liquidator, Mr. B. T. Crew, 4, Dove Court, Old Jewry, E.C.

Winding-up Petition

Halcyon Wireless Co., Ltd.—In the Chancery Division, Companies' Court, on October 26th, before Mr. Justice Eve, it was agreed to adjourn for four weeks the petition for the winding-up of this company.

General Cable Manufacturing Co., Ltd.—A petition for the winding up of this company has been presented to the High Court by the Attorney-General and will be heard in London on November 9th.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances :—

	CHEMICALS, Etc.	Price Oct. 28th.	Fortnight's Inc. or Dec.
a	Acid, Oxalic .. .. per lb.	5½d.	—
a	Ammoniac, Sal .. .. .. per ton	£60	—
a	Ammonia, Muriate (large crystal) .. ,,	£52	—
a	Borax .. .. ,,	£17	—
a	Copper Sulphate .. .. .. ,,	£25 10s.	—
a	Potash, Chlorate .. .. .. per lb.	3d. to 4d.	—
a	,, Perchlorate .. .. .. ,,	5½d.	—
a	Shellac T.N. .. .. .. per cwt.	£4 5s.	—
a	Sulphur Commercial .. .. .. ,,	£11	—
a	,, Roll .. .. ,,	£11	—
a	Soda, Chlorate .. .. per lb.	3d.	—
a	,, Crystals .. .. .. per ton	£5 to £5 5s.	—
a	Sodium Bichromate, casks .. .. per lb.	3½d.	—
	METALS, Etc.		
b	Aluminium, Ingots .. .. .. per ton	£95 to £100	—
b	,, Wire .. .. .. per lb.	1/1 to 1/9	—
b	,, Sheet and Foil .. .. ,,	1/1 to 2/9	—
b	Babbits Metal and Anti-friction Metals—		
	Grade I .. .. .. per ton net	£122	£2 dec.
	Grade II .. .. ,,	£87	£1 dec.
	Grade III .. .. ,,	£50	—
c	Brass (rolled metal 2" to 12" basis) .. per lb.	7¾d.	—
c	,, Tubes (solid drawn) .. .. ,,	9¼d. to 10d.	—
c	,, Wire, basis .. .. .. ,,	8¼d.	—
c	Copper Tubes (solid drawn) .. .. ,,	10¾d.	—
g	,, Bars (best selected) .. .. per ton	£75	
g	,, Sheet .. .. ,,	£75	—
g	,, Rod .. .. ,,	£75	
d	,, (Electrolytic) Bars .. .. ,,	nom.	—
d	,, ,, Sheets .. .. ,,	nom.	—
d	,, ,, Wire Rods .. ,,	nom.	—
d	,, ,, H.C. Wire .. per lb.	6⅛d.	⅛d. dec.
f	Ebonite Rod .. .. ,,	1/3 to 1/6	—
f	,, Sheet .. .. ,,	1/3 to 1/6	—
n	German Silver Wire .. .. .. ,,	2/2	1d. inc.
h	Gutta-percha, fine .. .. .. ,,	nom.	—
h	India-rubber, Para fine .. .. ,,	3⅛d.	—
i	Iron, Pig (Cleveland No. 3) .. .. per ton	58/6	—
l	,, Wire, galve. No. 1, P.O. qual. ,,	£20	—
g	Lead, English pig .. .. .. ,,	£14 15s.	5s. dec.
g	Mercury .. .. per bot.	£20	—
e	Mica (in original cases) small .. per lb.	6d. to 3/6	—
e	,, ,, medium .. ,,	4/- to 8/-	—
e	,, ,, large .. ,,	8/6 to 17/6 & up	—
p	Phosphor Bronze, plain castings .. ,,	1/1½d.	—
p	,, ,, drawn bars & rods ,,	11½d.	—
p	,, ,, rolled strip & sheet ,,	11½d.	—
p	,, ,, wire .. .. ,,	1/0½d.	—
o	Platinum .. .. per oz.	£9 16s.	3s. dec.
d	Silicium Bronze Wire .. .. per lb.	8½d.	⅛d. dec
r	Steel, magnet, in bars .. .. ,,	7¾d.	—
g	Tin, Block (English) .. .. .. per ton	£128 15s. to £130 15s.	£2 10s. to £3 10s. dec.
n	,, Wire, Nos. 1 to 16 .. .. per lb.	2/11	1d. inc.

Quotations supplied by :—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co.
p C. Clifford & Son, Ltd.
r W. F. Dennis & Co.

Electricity Supply

Lighting, Domestic, Power

Amble (Northumberland).—HEATING CHARGES.—The Urban District Council has fixed the flat rate for heating at 2½d. per kWh, plus 2s. 6d. per quarter meter rent.

Birkenhead.—LOANS.—The Corporation Electricity Committee is to apply for sanction to loans of £20,000 for mains and services, and £3,060 for the extension of the feeder to supply the new Mersey tunnel.

Bradford.—CONVERSION OF POLICE STATION TO SUB-STATION.—The Corporation Electricity Committee has approved a scheme for the conversion of Manningham police station into a district transformer sub-station, and the extension of e.h.p. mains from St. Mary's Road to Heaton Road, at a total cost of £6,067.

YEAR'S WORKING.—We have received from Mr. Thomas Roles, borough electrical engineer and manager, a copy of the report of the Electricity Committee, together with a statement of accounts of the electricity undertaking for the year ended March 31st last. Trade depression was responsible for a decrease of 4,619,076 kWh in the quantity of electrical energy consumed for power purposes and the slight decline of 177,109 kWh (from 93,172,146 to 92,995,037 kWh) in the total sales of electricity speaks well for the success of the undertaking in the other branches of supply; in particular, domestic consumption advanced by approximately 3,000,000 kWh. Despite the decrease in sales of energy the Department's total income of £619,198 represented an increase of £24,491 on the preceding year's figure. Working expenses rose from £365,167 to £378,617, while the gross profit amounted to £240,581 (£229,540). Interest on sinking fund charges were £23,712 lower than in the previous year and there was a net profit of £28,919, as against a deficit of £5,789 in 1929-30. During the year £322,300 was spent on capital account, making a total of £3,766,045 now spent on the undertaking. The total number of consumers at March 31st last was 33,885, this being an increase of 2,364 on the previous year's total.

Brighton.—INAUGURATION OF NEW PLANT.—The new 15,000-kW turbo-alternator, which has been installed at Smethwick power station by Messrs. Richardsons, Westgarth & Co., Ltd., is to be formally inaugurated by the Mayoress of Brighton on Wednesday next (November 4th). The ceremony will be followed by a luncheon at the Royal Pavilion.

EXTENSIONS.—The Corporation Electricity Committee is to provide a supply of electricity to the Bendigo Estate, North Patcham, at a cost of £500, and to the villages of Poynings, Saddlescombe and Fulking at a cost of £5,250. A sum of £1,600 has also been voted for a scheme of overhead distribution in Saltdean, and further feeder mains are to be laid in various districts at a cost of £4,786.

Burnley.—LATE SHOP-WINDOW LIGHTING.—The Corporation Electricity Department is introducing a reduced tariff for shop-window lighting and advertising sign illuminations to operate from the latest hour of closing instead of 11 p.m.

GRID SUB-STATION.—The Central Electricity Board proposes to erect a 33,000-V transformer sub-station at Burnley.

Carlisle.—SUPPLY TO CONVALESCENT HOMES.—The Corporation Electricity Committee has arranged to give a supply of electricity to the Gilsland Convalescent Homes at a cost of £2,000.

OVERHEAD LINES TO LONGTOWN AND BRAMPTON.—Sanction has been received to the borrowing of £13,667 in connection with the provision of overhead lines to Longtown and Brampton.

CHANGE-OVER.—The Electricity Committee is to apply for permission to change over the system of supply from d.c. to a.c. as opportunities occur.

Cheltenham.—YEAR'S WORKING.—The accounts of the Electricity Department (engineer: Mr. W. J. Bache) for the year ended March 31st last show a total revenue of £75,335 and a working expenditure of £56,444, leaving a gross profit of £18,891. The corresponding figures for the preceding year were: Income, £70,207; working expenses, £51,660; gross profit, £18,547. There was a net profit of £1,956, as against £2,640 in the preceding year. During the year the capital expenditure amounted to £14,810, making a total of £403,490 now spent on the undertaking. Sales of electricity increased from 7,296,471 to 7,663,124 kWh in spite of a decline of nearly 400,000 kWh in the energy consumed for traction purposes. The maximum demand recorded was 4,100 kW.

Cockfield (Durham).—ELECTRICITY SCHEME.—The Parish Council is to receive a grant from the Unemployment Grants Committee in connection with its scheme for providing an electricity supply to Cockfield Village, which has at present no means of illumination.

Continental.—ITALY.—Power production, although showing a moderate decline for the first nine months of the year, is still considered satisfactory, taking into account world conditions and their reaction on Italian industry. There are now some 780 large installations totalling 3,273,000 h.p., and smaller plants totalling 250,000 h.p., or 3,523,000 h.p. in all, working in Italy. During the first half of 1931 hydro-electric plants produced 4,570,000,000 kWh, against 4,931,000,000 kWh in 1930. In 1930 the total power production was 10,000,000,000 kWh, of which 9,820,000,000 kWh was produced by hydro-electric stations. Allowing for production not included in these statistics, the effective production was about 11,000,000,000 kWh. Hydro-electric power increased by only 4.1 per cent. as a result of the economic crisis. The increase in power installed was 10.9 per cent. At the present time hydro-electric plant under construction totals 1,784,657 h.p., and it will be able to produce 5,000,000,000 kWh a year. In Italy a total of 135 dams are in use, having a total storage capacity of about 1,300,000,000 cu. m., and 33 dams are under construction with a capacity of 400,000,000 cu. m. Power lines have a total length of 34,000 km. State subsidies amount to 92,000,000 lire a year.—*Reuter's Trade Service* (Milan).

RUSSIA.—We are informed by the Embassy of the Union of Soviet Socialist Republics that the Soviet Ukrainian Government is commencing next month the construction of two hydro-electric power stations on the river Boug, near the town of Pervomaysk (formerly called Olviopol). The stations are to be called the Upper and Lower Boug State power stations, and are to have capacities of 20,000 kW and 14,500 kW respectively. The estimated cost of the construction is 38 million roubles.

POLAND.—It is reported from Warsaw that the Swiss Motor-Columbus Company is in negotiation with Poland in regard to the electrification of the north-western part of that country, which is estimated to involve an outlay of about 100,000,000 Swiss francs. It appears that efforts to induce Swiss banks to become interested in the project have been unsuccessful, and the Swiss company has now approached a French financial group in the matter and is awaiting an intimation of its attitude. Should the scheme be realised it would mean the placing of large orders for electrical machinery and in this event the Polish works of the Brown-Boveri Company would be continued.

FRANCE.—A return just issued shows that the output of electrical energy by the 43 principal generating stations in France amounted during July to 716,525,951 kWh, as compared with 852,845,315 kWh in the corresponding month last year. Of the total, hydro-electric stations were responsible for 423,238,417 kWh and steam and internal combustion engine stations for 293,287,534 kWh.

Coventry.—FRINGE ORDER.—The Corporation Electricity Committee recommends consent to a Fringe Order to enable the Leicestershire and Warwickshire Electric Power Co. to supply premises in Corley.

Croydon.—NEW SUB-STATION.—The County of London Electric Supply Co., Ltd., is to erect a sub-station in Ash Road, Croydon.

PUMPING PLANT.—The Corporation Water Committee is to install electricity at the Addington pumping station at a cost of £160.

Eastbourne.—SHOWROOMS FOR HAILSHAM.—The Corporation Electricity Committee is making an offer for property in Market Square, Hailsham, for conversion into electricity showrooms.

SUPPLY TO FRISTON CHURCH.—A supply of electricity is to be provided to Friston parish church.

East Ham.—MAINS EXTENSIONS.—The Electricity Committee is to apply for sanction to the borrowing of £12,423 for mains extensions in the Romford Road area, £5,384 for mains extensions to sub-stations, £3,928 for extensions of distributor cables and £20,200 for consumers' connections.

Faversham.—ELECTRICITY FOR RADIO RECEIVERS.—At a meeting of the Town Council held on October 21st, it was decided that all electricity used for radio apparatus must be paid for at the lighting rate.

Glossop.—NEW ELECTRICITY CHARGES.—The Urban Electric Supply Corporation, Ltd., has introduced new tariffs for private residences and business premises. For the former there is a quarterly charge based on the size of the house and permitting the consumption of a definite quantity of electricity, all energy in excess being charged at 1½d. per kWh. For business premises a quarterly charge is made according to the requirements for lighting, with a " unit " charge of 1½d. One meter will be provided free of rental.

Great Yarmouth.—LOAN SANCTIONED.—The Town Council has received sanction to a loan of £12,983, balance of a loan of £42,743 for electricity purposes applied for last February.

Haydock (Lancs).—INAUGURATION OF SUPPLY.—The Lancashire Electric Power Company last week inaugurated a supply of electricity to Haydock. A temporary electric sub-station has been erected and is now in use pending the completion of a permanent brick structure.

Irish Free State.—ABBEYFEALE (CO. LIMERICK).—At the request of the Limerick County Board of Health arrangements have been completed with the Electricity Supply Board for the public lighting of the town of Abbeyfeale.

Isle of Man.—GOVERNMENT ELECTRICITY SCHEME.—Sir Claude Hill, the Lieutenant-Governor of the Isle of Man, has given instructions for a Bill to be drafted with the object of carrying out the House of Keys' plan for a Government electricity scheme for the island. The Bill will replace a measure rejected by the House of Keys last spring, and which granted a monopoly for supplying electricity throughout the island to a private company. The plan adopted by the House of Keys

includes the setting up of a Government Electricity Board, and supplying electricity to every town, village, and hamlet in the island.

Liverpool.—EXTENSIONS.—The Corporation Tramways and Electric Power and Lighting Committee has decided to extend h.p. and l.p. mains to Melling at an estimated cost of £1,694, and provide a transformer and switchgear at an estimated cost of £140. Application is being made to the Electricity Commissioners for the necessary Fringe Order.

London.—POPLAR.—The Borough Council Baths Committee has approved an estimate for the installation of an electric boiler at the Weston Street baths.

HAMMERSMITH.—The Borough Council Electricity Committee proposes to apply for sanction to the borrowing of a further £10,000 on account of the cost of changing the pressure of the supply throughout the borough.

The accounts of the Electricity Department show that, after allowing £10,000 for the purchase of meters and £7,540 for capital purposes, there was a net profit of £37,067 on the electricity undertaking for the year ended March 31st last. During the year approximately 3,000 wiring installations were provided under the assisted wiring scheme, bringing the total to 9,279, and the number of domestic electrical apparatus supplied on hire was 874, making a total of 2,065. Consumers at the end of the year numbered 21,211, as compared with 17,661 in the previous year, while the sales of electrical energy increased from 37,232,694 to 40,781,661 kWh.

Lowestoft.—LOANS SANCTIONED.—The Town Council has received sanction to loans of £2,588 for mains, £865 for substation plant and kiosks, £170 for meters, and £125 for changing over consumers' apparatus.

OVERHEAD LINES.—The Ministry of Transport has consented to the use of overhead lines for the transmission of electricity between Oulton and North Lowestoft, *via* Gunton.

Luton.—LOANS.—The Town Council has applied for sanction to the following loans:—Transmission line from Edlesborough to Cheddington, £4,891; e.h.p. feeder to Houghton Regis, £1,365; l.p. distributors to Ivinghoe, Pitstone Green, and Houghton Regis, £3,144; e.h.p. and l.p. switchgear, £346; kiosk, £167; transformers, £586; balancer, £416; and substation building, £50.

Macclesfield.—PROPOSED PURCHASE OF THE UNDERTAKING.—With reference to the proposal of the Town Council to purchase the undertaking of the Electricity Company of Macclesfield, Ltd., so far as the borough is concerned, the company in a letter to the Commissioners contends that, by segregating the borough from the rural area, the centre would be taken out of the complete and compact area and would become another of those isolated undertakings which it has been the policy in the past to abolish. Communicating with the Corporation, the Commissioners state that there is serious risk that the effects of purchase, not only as regards the area round Macclesfield, but also in the borough itself, may be detrimental to the proper development of the supply of electricity. They urge the Corporation to consider seriously whether it would not be in the public interest that it should negotiate with the company with a view to ascertaining if satisfactory concessions could be obtained if the Corporation should, on further consideration, agree to an extension of tenure. In reply, the town clerk has stated that the Electricity Committee would naturally be prepared to consider carefully any concessions that the company is willing to make in return for an extension of tenure.

Mansfield.—YEAR'S WORKING.—An increase from £57,721 to £58,627 in the total revenue of the Corporation Electricity Department is recorded in the report of the Electricity Committee for the year ended March 31st last. Working expenditure rose from £34,265 to £36,125, and there was a gross profit of £22,502, as compared with £23,456 in the preceding year. After providing for loan interest, sinking fund contributions, income tax, etc., there remained a net profit of £4,554, as against £3,922 in 1929-30. New consumers numbered 451, bringing the total connected at the end of the year to 5,662. Sales of electrical energy increased by 237,434 kWh to 5,927,965 kWh.

METERS.—The Corporation Electricity Committee has received sanction to the borrowing of £10,000 for meters.

Middlesbrough.—NEW CRANES FOR DOCKS.—The London and North Eastern Railway Company is to provide over forty new electric cranes at Middlesbrough Docks.

Portland.—ASSISTED WIRING.—The Urban District Council Electricity Committee has instructed the electrical engineer to prepare a standard specification for assisted wiring on which contractors could tender.

Port Seton (Berwickshire).—LIGHTING OF HARBOUR.—The Harbour Commissioners are to illuminate the harbour by electricity.

Price Reductions.—Reductions in charges for electricity have been made or recommended in the following districts:—

PRESTON (LANCS.).—Lighting, through ordinary meter: From 10d. to 8d. per kWh. Lighting, through prepayment meter: From 1s. to 10d. per kWh.

NENAGH (CO. TIPPERARY).—Lighting: To 10d. per kWh. Power: To 4d. per kWh.

BEDFORD.—Lighting flat rate: Zone 1 (in the borough), 5½d. per kWh; zone 2 (within a radius of 2½ miles from St. Paul's Church and in the Kempston urban district), 7½d.; zone 3, 9d. Lighting through prepayment meters: A reduction of ½d. per kWh. Heating, cooking and domestic appliances: Zone 1, winter quarters, 1d. per kWh, summer quarters, ¾d.; zone 2, 1½d. and 1d.; zone 3, 1½d. and 1d. "High" and "low" rates of two-part tariff: Zone 1, high rate, 5½d. per kWh, low rate, winter quarters ¾d., summer quarters, ½d.; zone 2, 7½d., 1d., and ¾d.; zone 3, 8d., 1d. and ¾d. Restricted hour power rate for consumers in the borough: 0.625d. per kWh, with a maximum annual consumption of 345,000 kWh, the maximum demand not to exceed 120 kWh.

EAST HAM.—Reductions involving concessions amounting to £18,000 per annum. The ordinary lighting rate is to be reduced from 4d. to 3½d. per kWh.

HAMMERSMITH.—Lighting, through ordinary meter: From 3¼d. to 3d. per kWh. Lighting, through prepayment meter: From 3¾d. to 3½d. per kWh. Lighting through prepayment meter (inclusive of hire of installation under assisted-wiring scheme): From 6d. to 5½d. per kWh. There will also be a reduction of ½d. per kWh in the lighting charges for shops, cinemas and public garages.

Roxburgh.—LIGHTING OF SANATORIUM.—The County Council has adopted a recommendation of the Property and Works Committee for the installation of electric lighting at the Anderson Sanatorium at a cost of £255.

Southend-on-Sea. — TRANSFORMER AND SWITCHGEAR FOR HOSPITAL.—The Town Council has applied for sanction to a loan of £931 for a transformer and switchgear at the new General Hospital.

Stoke-on-Trent.—MAINS EXTENSIONS.—The Corporation Electricity Committee is applying for sanction to a loan of £20,000 for mains extensions.

Taunton.—LOANS SANCTIONED.—The Town Council has received sanction to loans of £10,000 for mains and services, £3,000 for meters, and £3,000 for transformers.

REDUCTION OF METER RENTS.—Meter rents are to be reduced by 50 per cent.

Tynemouth.—METER RENT.—The Corporation Electricity Committee has fixed the rent for sub-meters with a capacity not exceeding 2 kW at one shilling a quarter.

United States.—ELECTRICAL DEVELOPMENTS.—According to *Power*, plans for the installation of a 50,000-h.p. generating unit at the Seal Beach, California, thermal plant of the Los Angeles Gas & Electric Corporation have been announced by Mr. A. B. Day, president and general manager of the corporation. The new unit, to be built at a cost of $3,500,000, will bring the capacity of the station to 148,000 h.p. A new 115,000-kW turbo-generator has also just been placed in operation in the Waukegan steam station of the Public Service Company, of Northern Illinois, bringing the total capacity of the station to 290,000 kW.

Winchester.—YEAR'S WORKING.—The accounts of the Corporation Electricity Department (engineer: Mr. R. Ayton) for the twelve months ended March 31st last show a total revenue of £38,406 and a working expenditure of £21,016, leaving a gross profit of £17,389. The corresponding figures for the preceding year were: Income, £36,302; working expenses, £22,020; gross profit, £14,282. After deducting capital and other charges there was a net surplus of £3,418, as against £1,712 in the preceding year. During the year the capital expenditure amounted to £6,039, making a total of £202,796 now spent on the undertaking. Electrical energy sold increased from 2,531,551 to 2,747,017 kWh and the maximum supply demanded from 1,383 to 1,418 kW.

Traction

Australia.—SALES TAX ON TRAMCARS.—Astonishment has been caused at the imposition by the Federal tax department of a sales tax of 6 per cent. on tramcars made by the Melbourne Tramways Board at its own workshops. The theory is that such cars are sold by the Board to itself for use on its own systems. The cost of building a tramcar is calculated at £3,000, to which the taxation authorities add 20 per cent. to arrive at the sale value. This at 6 per cent. amounts to £126 on each car. Mr. A. Cameron, chairman of the Board, states that the construction programme has been suspended until the sales tax has been removed.

THE SYDNEY HARBOUR BRIDGE.—The Railway Commissioners announce that the new Sydney Harbour Bridge will be ready for tramcars to pass over by the end of the year, but that the line may not be opened for public traffic until the official opening on March 19th.

Ayr.—PROPOSED TRAMWAY ABANDONMENT.—The Corporation Tramways Committee is considering the abandonment of its tramway system and the substitution of motor-omnibuses.

Bolton.—PROPOSED ABANDONMENT OF TRAMWAY SERVICE TO ROCHDALE.—The abandonment of the tramway service between Bolton and Rochdale is being considered by the Corporations of the two towns.

Blackpool.—RECORD TRAMWAY RECEIPTS DURING ILLUMINATIONS.—During the 31 days of the illuminations 6,807,000 people paid £53,500 to travel on trams and 'buses—a new record. Last year 6,590,985 passengers were carried and £50,072 was received in fares.

YEAR'S WORKING.—The report of the Corporation Transport Department (manager: Mr. Charles Furness) for the twelve months ended March 31st last showed that there is a slight decline in the income from the tramways (from £308,949 to £301,272), this decrease being accompanied by a corresponding fall, from £218,157 to £211,974, in the working expenditure. There was a gross profit of 89,298 (against £90,792 in the preceding year) to which was added the gross profit from the bus undertaking (£2,748), bank interest, etc., making a total of £93,442 available. After providing for capital and other charges there is a net surplus of £51,783 (£49,567 in 1929-30). Capital expenditure during the year amounted to £3,867, making a total of £1,121,464 now spent on the undertaking. The number of passengers carried increased from 48,096,731 to 48,273,955 and the car mileage from 3,467,801 to 3,472,302. The total traffic revenue per car mile fell from 21.33d. to 20.80d.

Bradford.—YEAR'S WORKING.—We have received from Mr. C. R. Tattam, general manager of the Corporation Tramways Department, a copy of his annual report together with a statement of accounts of the undertaking for the year ended March 31st last. Revenue from the tramways shows a decline from £540,735 to £482,954, the working expenditure totalling £429,229, as against £455,841 in 1929-30. The gross profit was £53,726, as compared with £84,894. Although the income from the trolley-'buses advanced by £38,741 to £100,054 this increase was counterbalanced by a rise from £56,931 to £95,237 in working expenses, and the gross profit at £4,817 showed little change from the preceding year's figure (£4,382). The motor-omnibus system and Parcels' Department recorded gross profits of £16,012 and £694 respectively, and these, with the gross profits from the tramways and trolley-'buses and revenue from other sources, were carried to the net revenue, making a total of £77,107 available. Capital and other charges amounted to £141,803, leaving a net deficit of £64,696, as compared with £29,963 in 1929-30. The net capital expenditure during the year was £52,245, making the total now spent on the undertaking £1,762,038. The total number of passengers carried decreased from 118,027,294 (tramways 88,414,713, trolley-'buses 9,323,222) to 115,314,985 (tramways 80,499,299, trolley-'buses 15,221,525), but the car mileage rose from 11,276,200 (tramways 7,113,736, trolley-'buses 1,174,387) to 11,401,452 (tramways 6,633,549, trolley-'buses 1,828,206).

Brazil.—RAILWAY ELECTRIFICATION.—According to the Rio de Janeiro correspondent of *The Times*, a decree has been signed authorising the electrification of the Central Railway. Tenders are to be submittted within six months.

Continental.—SWITZERLAND.—The work of electrification having been completed, electric trains commenced running on the Bodensee-Toggenburg railway on October 3rd, the twenty-first anniversary of the original opening of the line. The electrification work has been carried out on the same plan as that of the Swiss Federal Railway system, so that the rolling stock may pass from one to the other when necessary.

The Federal Railway authorities have applied to the Swiss Government for a credit of about £120,000 for the electrification of the Zurich-Uster-Rapperswil line, and for a further £160,000 in respect of the line between Delsberg and Delle. Work is approaching completion on the electrification of the line between Neuenburg and Col des Roches, a distance of about 24 miles. The necessary power will be supplied from an outdoor sub-station at Bauseyon.

Croydon.—TRAFFIC SIGNALS.—The Corporation Highways Committee recommends the installation of electric traffic signals at a cost of £400.

RENEWAL OF TRACK.—The tramway track is to be renewed at North End at a cost of £560.

Derby.—TROLLEY-'BUS SCHEME.—The substitution of trolley-'buses on several of the tramway routes is being considered by the Corporation Tramways Committee.

L.M.S. Railway.—IMPROVEMENT SCHEMES.—The widening and electrification of the line between Barking and Upminster and the construction of new stations at Southend, Westcliff and Leigh-on-Sea are included in a programme of improvements and extensions which are to be carried out this winter by the London, Midland & Scottish Railway at a cost of £2,000,000.

L. & N.E. Railway.—COLOUR LIGHT SIGNALLING.—Included in a £5,000,000 programme of improvements to be carried out this winter by the London & North-Eastern Railway Company is a scheme for the extension of its colour light signalling systems.

Newcastle-upon-Tyne. — PROTECTION OF TRAMWAYS. — A decision has been reached by the Northern Area Traffic Commissioners with regard to the protection of the Corporation tramway undertaking from Newcastle to Gosforth. The effect of the Commissioners' ruling is that the tramways are given a 1½d. protection for each trip.

Southern Railway.—FAILURE OF ELECTRIC SIGNALLING SYSTEM.—The failure of the electric signalling system, due to a fire at a signal-box near New Cross, was responsible for a considerable delay in the suburban services on the North Kent lines last Friday.

York.—TROLLEY-'BUSES.—Sanction to the operation of a trolley-'bus service to Fulford has been received by the City Council.

Telegraph and Telephone

Ariel Telegraphy.—ANGLO-FRENCH SERVICE.—Passengers on aeroplanes flying between London and Paris are now able to send telegrams while in the air. The messages are transmitted by radio to the Croydon or Le Bourget aerodromes, whence they are retransmitted by land-line to their destinations.

Brazil.—AUTOMATIC TELEPHONY.—An automatic telephone exchange has lately been completed in Bello Horizonte, the chief town of the Brazilian province of Minas Geraes, by the Companhia Telefonica Brazileira. Starting with an initial installation for 3,000 subscribers, equipment has been provided for an ultimate total of 6,000.

Canada.—TELEGRAPHY.—According to the Dominion Bureau of Statistics at Ottawa, the various telegraph and cable systems operating in Canada last year received revenue amounting to $14,264,997, a decrease of $1,991,444, or 12.2 per cent. Operating expenses declined to $11,791,291, the total net revenue being $2,473,706, as compared with $3,666,077 in 1929. The telegraph and cable companies reported new construction valued at $2,395,879, in addition to alterations and repair work costing $1,782,117. Pole-line length amounted to 52,824 miles, and wire mileage increased by 10,864 to a total of 371,747 miles at the end of the year. The number of telegrams transmitted decreased by 2,471,749 to 15,558,224, the total being additional to 1,142,696 cablegrams. Cablegrams received numbered 5,602,524, including 4,709,556 carried to the United States by the Western Union Company at its Canso station. The number of telegraph offices in Canada decreased by 104 to 4,661, inclusive of 37 Canadian telegraph offices located in the United States and elsewhere. The number of employés decreased by 725 to 7,331, their salaries and wages aggregating $8,674,453.

International Telephony. — ANGLO-DANISH CIRCUIT. — The Postmaster-General announces that a second direct telephone circuit between London and Copenhagen has been brought into service.

Italy.—SHORT-WAVE TELEPHONY.—The Marchese Marconi has been successful in holding a wireless telephone conversation between Santa Margherita and Sestri Levante, a distance of a little over ten miles, on a wavelength of only half a metre.

PHOTO-TELEGRAPHY.—The Berlin system of transmitting pictures by wireless was inaugurated by the Pope on October 24th between Vatican City (Rome) and Paris (Eiffel Tower station) by means of short waves. The apparatus used is almost the only equipment of non-British manufacture in the Vatican radio station.

The Telephone Service.—BRISTOL'S AUTO-EXCHANGE.—The conversion of Bristol City's system from manual to automatic switching commenced on Nov. 28th, when the initial exchange equipment for 10,000 subscribers came into operation at midnight.

Radio

Aerial Rental.—TYNEMOUTH.—The Town Council has abandoned the rental charge of one shilling for the fixing of a wireless aerial to a Corporation house. The Council was informed by the Postmaster-General that other local authorities had withdrawn the imposition and he expressed the hope that Tynemouth Council would do the same.

Germany.—LICENCES.—The number of licensed listeners increased during the quarter from July 1st to October 1st by 12,354 to 3,731,948, which represents an increase of 222,439, compared with January 1st, 1931. Since the last total includes 218,191 licences issued free to the unemployed, war-wounded, &c., the increase means merely an increase in numbers rather than in revenue, says *World-Radio*. Taking a population of 64,484,000 as a basis, there are 57.7 wireless sets for every 1,000 inhabitants.

South Africa.—NEW STATION.—There are now five transmitters in the Union. The latest to be opened by the African Broadcasting Co. is situated at Bloemfontein and operates on a wavelength of 510 metres.

The Radio Society of South Africa says in its annual report that outstanding features of progress during the year are the general use wherever possible of a.c. mains-operated sets; the introduction of short-wave adapters for use with broadcast receivers, the combination functioning on the supersonic heterodyne principle; the increasing number of far-reaching short-wave transmitting stations; closer operation, or amalgamation, between radio manufacturers and gramophone companies; and improved prospects of practical television by the use of the cathode ray in lieu of a scanning disk.

U.S.A.—HIGH-POWER STATIONS.—After more than a year's deliberation the Federal Radio Commission has decided the final apportionment of high power among stations in the five radio zones into which the U.S.A. has been divided. The Commission granted the maximum of 50 kW to nine stations, and 25 kW to six stations. According to *World-Radio* the decision has been come to in conformity with a general order that there shall be only four stations in each of the five zones using the maximum power, or a total of twenty throughout the entire country.

SHORT-WAVE RECEIVERS.—Criminals having equipped their motor-cars with short-wave radio receivers in order to frustrate the police, the Michigan State Legislature has made it a felony for any private car to be so equipped. Only the police may install such sets.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia.—Melbourne.—December 9th. Victorian Railway Commissioners. Underground cables and junction boxes. (A.X. 11152.)*

December 1st. Post and Telegraph Department. Condensers. (A.X. 11111.)*

January 4th. Paper and varnished cambric insulated, lead sheathed, steel wire armoured cable. (A.X. 11127.)*

Batley (West Riding).—November 4th. County Council. Electric wiring in connection with alterations to Tuberculosis Dispensary. Specifications from the West Riding architect, County Hall, Wakefield.

Bradford.—November 7th. Tramways Committee. Twelve months' supply of general stores, including electric fittings for tramcars and insulating materials. Particulars from the tramways general manager, 11, Forster Square.

Cheadle and Gatley.—November 10th. Electricity Department. A 250-kVA transformer switch and distributor kiosk sub-station. (October 16th.)

Czecho-Slovakia.—Prague.—November 30th. Elektrické Podniky (Electrical Enterprises). Underground cables. (October 23rd.)

Dublin.—November 9th. Dublin United Tramways Co. (1896), Ltd. Twelve months' supply of general stores, including electric lamps and fittings. Particulars from the company's offices, 9, Upper O'Connell Street, Dublin.

Dundee.—November 2nd. Corporation. Lifts at the new municipal offices, City Square. Conditions of contract, &c., from the official quantity surveyor, 91, Commercial Street.

East Lothians.—November 16th. County Council. Various works, including electric lighting in connection with housing schemes. Specifications, etc., from the county architect, Property and Works Department, Haddington.

Egypt.—Cairo.—November 14th. Ministry of the Interior. H.p. and l.p. underground distribution system, including transformers and kiosks, for Mansourah. (A.X. 11136.)*

November 11th. Power station distribution system for Tahta. (A.X. 11093.)*

December 22nd. Electric power station for the town of Fikria. (A.X. 11140.)*

November 10th. Prison Administration. Electric motors, fans, boilers, etc. (A.X. 11091.)

Fife.—November 2nd. County Council. Installation of electric lighting etc., at 20 houses at Aberdour. Schedules, etc., from Mr. J. T. Scobie, architect, Douglas Street, Dunfermline.

India.—New Delhi.—January 7th. Indian Stores Department. A.c. and d.c. ceiling fans. (A.X. 11116).*

November 16th. Copper conductors. (G.X. 10826.)*

November 19th. A.c. and d.c. house service meters. (A.X. 11149.)*

January 26th. A.c. and d.c. table fans. (A.X. 11117).

Kidderminster.—November 7th. Worcestershire Public Assistance Committee. Installation of electric lighting and power at the Poor Law Institution. Specification (deposit £5 5s.) from Messrs. Moffet, Rosher & Mann, consulting engineers, Union Chambers, Temple Row, Birmingham.

London.—Office of Works.—November 2nd. Electric bell material. (October 23rd.)

November 10th. Wire and cable. (See this issue.)

Luton (Beds.).—November 2nd. Rural District Council. Wiring 90 houses for electric lighting. Particulars from Mr. H. Pickering, surveyor, 73, West Parade, Dunstable.

Manchester.—November 2nd. Electricity Committee. Coal conveyor and coal-handling plant. (October 23rd.)

New Zealand.—Wellington.—December 7th. Post and Telegraph Department, 6,800 galvanised earth rods. (G.X. 10829.)*

December 8th. 2,000 carbon diaphragms. (A. 11131.)* 200 head receivers. (A. 11133.)*

December 1st. Public Works Department. Electrically heated annealing furnaces for turbine buckets. (A. 11090.)*

December 15th. Public Works Department. 50-kV oil-immersed circuit breakers for Arapuni. (A.X. 11118.)*

December 11th. Thames Valley Electric Power Board. Static condensers. (A.X. 11160.)*

December 18th. New Zealand Railways. Armoured cables and junction boxes. (A.X. 11122.)*

January 18th. Railway overhead equipment. (G.X. 10792.)*

February 29th. Three automatic railway sub-stations. (A.X. 11105.)*

Salford.—November 10th. Electricity Department. Sub-station fuseboards and transformers banks. (See this issue.)

Siam.—November 14th. Post and Telegraph Department. Telephone terminal boxes and accessories. (A.X. 11088).*

South Africa.—Johannesburg.—City Council. Cable. (A.X. 11145.)*

November 19th. Single- and three-phase oil-immersed transformers. (A.X. 11148.)* 40 miles of copper wire for overhead conductors. (A.X. 11154.)* Switchgear. (A.X. 11158.)*

Cape Town.—November 10th. Automatically controlled, electrically driven sewage pumping equipment for Bokmakierie. (G.X. 10820.)*

Sowerby Bridge (West Riding).—November 4th. County Council. Electric wiring in connection with alterations to Tuberculosis Dispensary. Specifications from West Riding architect, County Hall, Wakefield.

*Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Bexhill.—Electricity Committee. Recommended:—
Meters (£1,216).—Edison Swan Electric Co., Ltd.

Bury St. Edmunds.—Town Council. Accepted:—
H.p. switchgear (£738).—Ferguson, Pailin, Ltd.

Croydon.—Electricity Committee. Recommended:—
Switchgear (£4,420).—A. Reyrolle & Co., Ltd.

East Ham.—Electricity Committee. Recommended:—
Cables.—Contract renewals for twelve months.—General Electric Co., Ltd.; Liverpool Electric Cable Co., Ltd.

Grimsby.—Electricity Committee. Recommended:—
Cables for twelve months (£15,566).—Johnson & Phillips, Ltd.

London.—Southwark.—Electricity Committee. Recommended:—
Electric sign on cooling tower.—Electric Sign Co., Ltd.
Feeder pillars.—W. Lucy & Co., Ltd.
Accepted:—
Electrolytic copper bar.—British Insulated Cables, Ltd.
Junction boxes.—H. Dunn & Co.
Armoured cable.—Metropolitan Electric Cable & Construction Co., Ltd.
Meters.—Measurement, Ltd.
Maximum demand indicators.—Reason Manufacturing Co., Ltd.

Islington.—Cleansing Committee. Recommended:—
Batteries for two electric vehicles (£129).—Britannia Batteries, Ltd.
Electricity Committee. Recommended:—
Supply and laying of mains (£6,831).—Power Lines Construction Co., Ltd.

Bethnal Green.—Borough Council. Accepted:—
Electrical installation at Leopold Buildings.—Alpha Manufacturing & Electrical Co., Ltd.

Tottenham.—Urban District Council. Accepted:—
Electrical installations at the baths and wash-houses.—Alpha Manufacturing & Electrical Co., Ltd.

Manchester.—Electricity Committee. Accepted:—
Constructional steelwork, etc., for telpher plant at Barton station.—Harry Peers & Co.
Low-pressure water pipes, supports, etc., at Barton station.—John Thompson, Ltd.

Portsmouth.—Electricity Committee. Recommended:—
Switchboards (£1,796).—English Electric Co., Ltd. Twenty-nine tenders were received ranging from £1,313 to £2,690.

Surrey.—County Mental Hospitals Committee. Electrical installation at mental hospitals:—
Netherne (£5,143) and Brookwood (£1,057).—Cyril F. Williams.

In the case of the Netherne Institution eleven tenders, ranging from £5,143 to £6,119, were received; for the other installation the tenders also numbered eleven and varied from £1,057 to £1,609.

Smethwick.—Works Committee. Accepted:—
Electric lighting at works depôt, Rolfe Street.—Walker & Co.

Southend-on-Sea. — Town Council. Accepted. — Electrical appliances for one year:—
Cooking apparatus.—Credenda Conduits Co., Ltd.; General Electric Co., Ltd.; Belling & Co.
Water-heating apparatus.—Drake & Gorham Wholesale, Ltd.; Electric Fires, Ltd.; Santon, Ltd.
Wash boilers and washing machines.—Burnley Components, Ltd.

The Council has also accepted the tender of J. Christopher & Son for a lift for the electricity works store at £368.

Tynemouth.—Corporation. Accepted:—
Installation of electricity in the new Linkskill Council school.—J. R. Fenwick.

Forthcoming Events

Illuminating Engineering Society.—Friday, October 30th. Royal Society of Arts, London. 6.30 p.m. Discussion on "Some Impressions of the I.I.C. Floodlighting." Opened by Mr. P. Good.

Institute of Marine Engineers.—Friday, October 30th. Hotel Victoria, London. Annual conversazione.

Association of Supervising Electrical Engineers.—Saturday, October 31st. Visit to Metropolitan Cable Works, Chadwell Heath.

Electrical Power Engineers' Association (London Local Group).—Tuesday, November 3rd. Livingstone House, Broadway, S.W. 7.15 p.m. "Modern High Pressure Boiler Plant and Practice." Mr. L. Morton.

Institution of Civil Engineers.—Tuesday, November 3rd. Institution, London. 6 p.m. Presidential address. Sir Cyril R. S. Kirkpatrick.

Royal Institution.—Tuesdays, November 3rd and 10th. Institution, London. 5.15 p.m. "The Combustion of Gases in Electric Discharges." Mr. G. Ingle Finch.

Association of Mining Electrical Engineers (London Branch).—Tuesday, November 3rd. Junior Institution of Engineers, London. 6.30 p.m. Presidential address. Mr. H. Brooke.

Institution of Engineering Inspection.—Wednesday, November 4th. Connaught Rooms, W.C. Annual dinner and dance.

Institution of Heating and Ventilating Engineers.—Wednesday, November 4th. Swedenborg Hall, W.C. 7 p.m. "Recent Developments in Cooking Apparatus." Mr. J. Benham.

Institution of Electrical Engineers.—Thursday, November 5th. Institution, London. 6 p.m. "Coil Ignition Systems." Mr. E. A. Watson. (*London Students' Section*).—Friday, October 30th. Institution, London. 6.15 p.m. "The Business of Electrical Apparatus Manufacture." Mr. G. J. Shaw and Mr. G. A. M. Hyde. Wednesday, November 4th. 2.30 p.m. Visit to the Foster Engineering Co., Ltd., Wimbledon, S.W. (*North Eastern Students' Section*).—Saturday, October 31st, 2.30 p.m. Visit to automatic telephone exchange, Newcastle-on-Tyne. (*Mersey and North Wales (Liverpool) Centre*).—Monday, November 2nd. Laboratories of Applied Electricity, The University, Liverpool. 7 p.m. "Recent Progress in Large Transformers." Mr. R. M. Charley. "The Application of the Induction Voltage Regulator." Mr. W. E. M. Ayres. (*South Midland Students' Section*).—Tuesday, November 3rd. University, Birmingham. 7 p.m. "Long Distance Telephony of To-day." Mr. L. S. Crutch. (*North-Western Students' Section*).—Tuesday, November 3rd. Engineers' Club, Manchester. 7.15 p.m. "The Cost of Electricity, Present and Future." Mr. L. Romero. (*Wireless Section.*)—Wednesday, November 4th. Institution, London. 6 p.m. Chairman's address. Col. A. S. Angwin. (*Meter and Instrument Section*).—Friday, November 6th. Institution, London. 7 p.m. Chairman's address. Mr. F. C. Knowles.

Diesel Engine Users' Association.—Thursday, November 5th. Caxton Hall, Westminster, S.W. 3.30 p.m. "The Elimination of Vibration." Mr. R. B. Grey.

Electrical Association for Women.—Thursday, November 5th. 3 p.m. Visit to Gerrard and Regent telephone exchanges. Institution of Electrical Engineers, London.

Commercial Motor Transport Exhibition.—November 5th-14th. Olympia, S.W.

Leeds Electrical Club.—Friday, November 6th. Hotel Metropole, Leeds. 7.30 p.m. Dinner-dance.

Junior Institution of Engineers.—Friday, November 6th. Institution, Victoria Street, S.W. 7.30 p.m. "The Cooling of the Crude Oil Engine." Mr. A. P. Quarrell.

Institution of Mechanical Engineers.—Friday, November 6th. Institution, London. 6 p.m. Thomas Hawksley lecture, "The Mechanical Aspects of Electricity." Mr. Ll. B. Atkinson.

Our Service Department

Inquiries must be accompanied by a stamped addressed envelope.

We shall be glad to learn the name and address of the makers of the following:—

ACCURATE double reading voltmeter.

WILLIE THE WARMER radiator.

Electric combined drilling and sawing machine.

Notes

Overhead Lines Association

The Association's transformer committee, which is representative of both users and manufacturers, is considering the preparation of a standard specification for the external features and rating of transformers specially suited for rural distribution. The smaller sizes would be for pole mounting and the larger ones for pedestal or platform mounting. A stage has been reached at which it is advisable to ascertain the existing practice of users, and it has been decided to circulate a questionnaire. The committee has been reluctant to take this course, but feels that as in this case the information is not required for the use of one undertaking only, but for the benefit of all, it may hope that all concerned will answer as many of the questions as is possible. It is not expected that any one reply will contain answers to all or nearly all, the questions, but the more information the committee can obtain, the greater is the probability that a satisfactory specification can be prepared, so that reduced cost and improved service may follow. If any information is required Mr. W. Fennell, Electricity House, Northwich, Cheshire, will reply to questions.

The Physical Society's Exhibition

The twenty-second annual exhibition of electrical, optical and other physical apparatus is to be held by the Physical Society and the Optical Society on January 5th, 6th and 7th, 1932, at the Imperial College of Science and Technology, South Kensington. As on previous occasions, there will be a trade section, a research and experimental section, and the section for the work of apprentices and learners is to be continued. Offers of exhibits should be communicated not later than November 9th to the secretary, Exhibition Committee, 1, Lowther Gardens, Exhibition Road, S.W.7. For the encouragement of craftsmanship and draughtsmanship in the scientific instrument trades apprentices and learners may exhibit, in competition, specimens of their work, providing they are in the regular employ of a firm which is exhibiting at the next annual exhibition, or has exhibited once during the past three years.

Faraday House Dinner

The annual dinner of the Faraday House Old Students' Association was held on October 23rd at the Savoy Hotel, London, W.C. As usual the function was a most enjoyable one, and the speeches were brief and informal. This year's president, Mr. G. R. J. Parkinson, was in the chair.

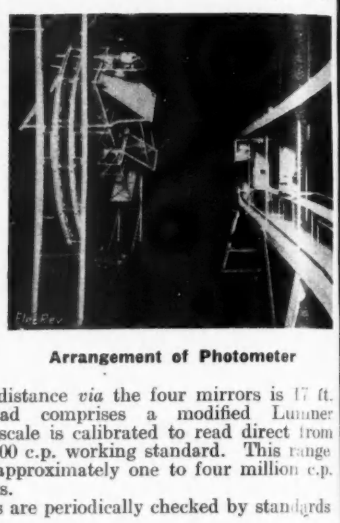
The toast of "Faraday House and its Old Students" was proposed by Capt. J. M. Donaldson, M.C. (President, I.E.E.), who said that the loss through dropping a function of this kind on the score of economy would have far exceeded any gain. For the rest, he was most amusingly anecdotal. Dr. Alexander Russell, F.R.S., responding, attributed the progressive character of the previous speaker's undertaking to the employment of seventeen Faradians on its staff. The sons of four old students had been entered during the year, and a new student (Mr. F. Ince) was the great-grandson of one of the founders and a grandson of Ferranti.

Mr. S. B. Haslam, proposing "The Guests," compiled a well-selected Cabinet of those present to carry the country over its present difficulties, and Sir John Brooke, C.B. (vice-chairman of the Electricity Commissioners) made a reply that can only be referred to as a most brilliant performance. Sir Robert Robertson, D.Sc., LL.D., F.R.S. (Government Chemist), also replied, deprecating the monopoly of Faraday's fame by electrical engineers, since, he reminded us, Faraday was also a great chemist. Mr. S. P. Doudney ran over the outstanding points of Mr. Parkinson's career in proposing the health of "The Chairman."

A Universal Photometer

The accompanying illustration is of the photometer installed at the Ponders End works of the Edison Swan Electric Co., Ltd. It comprises a long bench and swing cradle enabling readings to be taken through 180 deg.

The lamp to be tested is suspended from an adjustable bracket, attached to the wall, which is rotated by a motor. The cradle contains three mirrors which deflect the light coming vertically downwards from the unit under test into a horizontal direction on the photometer axis.



Arrangement of Photometer

Another adjustable 45-deg. mirror at the end of the bench reflects the light along the bench, so that powerful units can be located upwards of 100 ft. from the photometer head; for ordinary units the distance *via* the four mirrors is 17 ft.

The photometer head comprises a modified Lummer Brotthun screen. The scale is calibrated to read direct from 80 to 4,000 c.p. with a 100 c.p. working standard. This range can be increased from approximately one to four million c.p. by the use of multipliers.

The working standards are periodically checked by standards calibrated by the N.P.L.

The I.E.E. Building

In his inaugural address as president of the Institution of Electrical Engineers, Capt. J. M. Donaldson, M.C., remarked, *inter alia*, that most members knew that their building originally belonged to the Royal College of Physicians and Surgeons, and that it was adapted for the I.E.E. requirements at some considerable cost. The membership of the Institution has, however, increased so much, and its activities have grown to such an extent that it seems likely that in the future some other arrangements will have to be made for its accommodation and for offering hospitality to various kindred societies from time to time. The building is held on a long lease from the Duchy of Lancaster, and the desirability of a home built particularly for their requirements and on a more permanent basis has always been in mind. A suitable site, however, is by no means easy to find, but it may be that in the near future some such site will be available. Should this be the case, no doubt the Council will consider all the possibilities, with a view to the ultimate erection of a worthy and well-designed building in the future.

The Institute of Fuel

The fifth annual dinner of the INSTITUTE OF FUEL was held on October 21st at the Connaught Rooms, London, W.C.

In proposing the toast of "The Fuel Industries," Sir Arthur Duckham, G.B.E., deprecated the tendency of politicians to encroach upon the sphere of the industrialist. Sir Hugo Hirst, Bart. (president), responded. He said that while tariffs would give us some security for putting our house in order, the real solution of our present troubles lay in our own efforts. Just as coal, through steam, had brought us prosperity after the Napoleonic wars, so would coal restore our fortunes through the agency of electricity, gas, coke, oil and other derivatives that provided the basis of some industry or other. The Institute of Fuel should organise to that end.

The toast of "The Visitors" was proposed by Sir John Cadman, K.C.M.G., who said that the more imported oil was used the greater the amount of coal required; thus, a motor car used an average of 7 tons of petrol during its life and required 7 tons of coal for its construction. Our coal was still the best in the world; we had geography on our side, and all that was necessary was to put politics on one side and to think of our country first.

Lord Gainford, P.C., responding, expressed the view that the Government could do much for research in the production of petrol from coal and other at present unremunerative but promising developments. He was the first Minister to obtain (in 1916) a grant for industrial research from a Government.

Sir David Milne-Watson, LL.D., proposing the health of the president, who briefly replied, said that 2½ years ago the membership of the Institute of Fuel was 622; to-day it was 1,037

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

At the time of going to Press, the results of the General Election were incomplete, but the following gentlemen connected with electrical affairs have been elected:—**Mr. P. J. Pybus** (Harwich), Minister of Transport, **Sir Philip Dawson** (Lewisham (West)), and **Mr. G. M. Gillett,** Parliamentary Secretary to the Ministry of Transport (Finsbury). **Mr. Herbert Morrison,** the former Minister of Transport, was defeated.

At last week's meeting of the Association of Supervising Electrical Engineers, the retiring president, Mr. S. B. Donkin, presented cheques to the winners of the 1931 Economic Premiums Competition—**Mr. C. R. G. Hughes** (London), **Mr. E. J. Wells** (Leicester), **Mr. A. H. Olding** (London), and **Mr. L. M. Bruce** (London).

Mr. J. S. Pickles was on Monday appointed by the Dumfriesshire County Electricity Committee county electrical engineer in succession to **Mr. C. R. Westlake** who has taken up his appointment as chief engineer and manager of the Electricity Board for Northern Ireland.

Lt.-Com. Haydn T. Harrison, M.I.E.E., informs us that he has resigned his position as chief technical advisor to the Benjamin Electric, Ltd., with the object of devoting more of his time to the Electric Street Lighting Apparatus Co. (ESLA. Co.). He will retain his office at 4, Iddesleigh House, Westminster. (Tel. 2943).

Mr. H. Pickard was presented with the Students' Premium at the opening meeting of the North Midland Centre of the Institution of Electrical Engineers, held on Wednesday last.

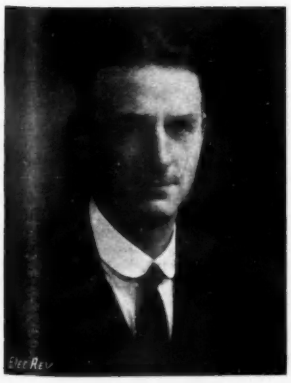
Mr. H. W. Cremer, M.Sc., has been appointed honorary secretary of the Institution of Chemical Engineers, in the place of the late Professor J. W. Hinchley.

Mr. C. W. O. Rochs is retiring on November 4th from the position of Chief of Traffic Production to Imperial and International Communications, Ltd., to which post he was appointed two years ago when Marconi's Wireless Telegraph Company, for which he was traffic manager, was merged in the I. & I. C. Mr. Rochs joined the Halifax and Bermudas Cable Co., Ltd., in 1889, and when the Direct West India Cable Co. was formed in 1897, he was appointed secretary to both companies. He left to take up his position as traffic manager with the Marconi Company in January, 1914. He represented the Marconi Company as a delegate to various international telegraph conferences at Paris, Brussels, and elsewhere. When Mr. Rochs joined the Marconi Company there was only one shore-to-shore wireless telegraph circuit, viz., between Clifden (Ireland) and Glace Bay (Canada), and it could only handle telegrams between Great Britain and Canada and the United States, so it will be obvious that he must have been intimately associated with many events of an important character connected with this means of communication.

[*Press Portrait Bureau*

Mr. C. W. O. Rochs, who is retiring from the service of Imperial and International Communications, Ltd.

In our last issue we gave the names of three electrical engineers which had been submitted to St. Pancras Borough Council for the appointment of electrical engineer and manager of the electricity undertaking. We are now informed that at a meeting of the Council on October 21st **Mr. Robert Lee** was appointed to that position. Mr. Lee commenced his electrical career in 1905 as junior engineer at Stockport, becoming successively technical assistant in 1908 and deputy electrical engineer in 1915. He left Stockport in 1927 to take up the appointment of borough electrical engineer and manager of St. Helens Corporation electricity undertaking, and returned to Stockport in 1929 as borough electrical engineer, which position he is now relinquishing.



[*Lafayette*

Mr. R. Lee, who has been appointed electrical engineer and manager of the St. Pancras undertaking

In this issue we publish a description of the new Clarence Dock power station of the Liverpool City Council. **Mr. P. J. Robinson, M.I.E.E.,** city electrical engineer, whose portrait appears herewith, was responsible throughout for the design and construction of the station. Mr. Robinson succeeded the late Mr. H. Dickinson as city electrical engineer in 1928. He commenced his career in the district as engineer and manager of the Garston and District Electric Supply and Tramways Co. When the undertaking was purchased by Liverpool City Council in 1902, Mr. Robinson was made assistant engineer at Pumpfields power station. Later he became successively mains engineer, superintending engineer of stations and chief engineering assistant to the city electrical engineer. From 1920 to the date of his appointment as city electrical engineer he acted as deputy engineer.

[*J. Bacon & Sons.*

Mr. P. J. Robinson, city electrical engineer of Liverpool, whose new station is described in this issue

Mr. W. H. Cooper has been appointed by Southend-on-Sea Town Council as commercial assistant in the Electricity Dept. at a salary of £350 per annum.

Major R. W. Cooper, chairman of the British Aluminium Co., Ltd., has been elected president of the Alliance Aluminium Co., Ltd., the new international aluminium cartel, reference to which is made in our Business and Industrial Notes to-day.

We regret to learn that **Mr. A. G. Shearer,** chairman of the North-Eastern Centre of the Institution of Electrical Engineers, was unable to be present at the opening meeting of the Centre owing to illness. His address was read by Mr. C. Turnbull, senior vice-chairman.

Mr. James Sellars has been appointed public lighting engineer to the Manchester Corporation.

Mr. T. Gerrard, of Newmarket, has been appointed electrical engineer by the Mirfield Urban District Council, in succession to Mr. J. Lomas, at a salary of £250 per annum, and **Mr. H. Day,** who has acted as assistant to Mr. Lomas, has been appointed assistant electrical engineer. Mr. Gerrard is at present assistant engineer and consumers' engineer to the East Anglian Electric Supply Co., Ltd.

Obituary

Mr. J. H. Armstrong.—The death has occurred at Bournemouth of Mr. John Hobart Armstrong, aged 78, who was formerly chairman of the Newcastle-upon-Tyne Electric Supply Co., Ltd. He was also associated with Messrs. A. Reyrolle & Co., Ltd., Tyneside Tramways, Ltd., and a number of other undertakings.

Mr. A. Mercer.—The death is announced, at the age of 49 years, of Mr. Alfred Mercer, who for the past eight years had been assistant mains engineer with the Woking Electric Supply Co., Ltd.

Faraday Celebrations at Rugby

As a contribution to the Faraday Centenary celebrations an engineering exhibition was held under the auspices of the Rugby Engineering Society at Rugby on Thursday and Friday last week. The exhibition was opened by Mr. Frank Hodges, member of the Central Electricity Board, who said that in the future electricity must play an important and greater part in strengthening the industrial position of the country. He referred particularly to main-line railway electrification, which question would come to the fore again as soon as the present economic crisis was over. He was convinced that full electrification would be the right way to tackle the problem rather than by way of a scheme embracing Diesel-electric driving.

As was to be expected, the majority of the exhibits were contributions from the two large concerns which play such an important part in Rugby's life—the British Thomson-Houston Co., Ltd., and the English Electric Co., Ltd.—depicting past and present developments by these companies. The exhibition was largely popular in character and from that point of view experiments staged by the students' section of the Rugby Engineering Society and the Science Laboratory of Rugby School were probably of the greatest interest. The exhibit of the R.E.S. took the form of a replica of Faraday's laboratory at the Royal Institution. In conjunction with the exhibition the Faraday film shown a few weeks ago in connection with the major celebrations in London was again displayed.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Maidstone Radio Central Exchange, Ltd.—Public company. Registered October 23rd. Capital, £5,000 in 4,500 10 per cent. cumulative preference shares of £1 and 10,000 ordinary shares of 1s. each. Objects: To acquire from Radio Central Exchanges, Ltd., the benefit of the consent of the Maidstone Borough Council for the placing of wires for the purpose of a broadcast relay service in Maidstone, and as to the Postmaster-General's licence in connection therewith, etc. The directors are: A. B. Winch, Broomhall, Broadbridge Heath, Sussex (director Radio Central Exchanges, Ltd.); and W. T. Whalley, Granville House, Byfleet, Surrey (managing director of Radio Central Exchanges, Ltd.). Registered office: 37, Walbrook, E.C.4.

Fagin's, Ltd.—Private company. Registered October 19th. Capital, £1,000 in £1 shares. Objects: To acquire the business of an electrical and radio factor and manufacturer carried on by J. Fagin at 13, Union Street, and 2, Station Road, Aldershot, Hants. The directors are: J. Fagin and Mrs. Doris L. Fagin, both of 79, St. Michael's Road, Aldershot. Secretary: L. Scott. Registered office: 13, Union Street, Aldershot, Hants.

Electrical and Wireless Equipment Supplies, Ltd.—Private company. Registered October 19th. Capital, £250 in £1 shares. Objects: To carry on the business of manufacturers and repairers of electrical goods of all kinds, including wireless equipment. The first directors are: A. C. C. Buckle and R. W. Forder, both of 5, Calverley Lane, Rodley, Yorks. Secretary: W. B. Bennett. Registered office: 5, Calverley Lane, Rodley, Yorks.

T. D. Young & Sons, Ltd.—Private company. Registered October 17th. Capital, £1,500 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless and television apparatus, electrical fittings, gramophones, &c. The directors are: T. D. Young, Mrs. A. B. Young, W. Young, and T. D. Young, all of 23, Noel Street, Nottingham. Secretary: W. Young.

Collectron, Ltd.—Private company. Registered October 17th. Capital £1,000 in £1 shares. Objects: To acquire the business of electricians, etc., carried on at 33a, Watergate Street, Chester. The subscribers are:—C. A. Collins, "Eastwood," Belgrave Road, Chester; and D. B. McQueen, The Bungalow, Sanghall Road, Little Sanghall, near Chester. The first directors are:—C. A. Collins (chairman for life) and a nominee of G. & W. Collins, Ltd. Registered office: 33a, Watergate Street, Chester.

Majestic Electric Co. (I.F.S.), Ltd.—Private company. Registered in Dublin on October 17th. Capital £500 in £1 shares. Objects: To manufacture, equip, maintain, repair, let on hire and deal in all radio apparatus, gramophones, etc. The subscribers are:—F. A. Marks, 6, Ainslies Belvedere, Lansdowne Road, Bath; and W. C. Langford, 39, Salisbury Road, Redland, Bristol. The first directors are not named.

Tyne Illuminations, Ltd.—Private company. Registered October 21st. Capital £100 in £1 shares. Objects:—To carry on the business of electricians, electrical and mechanical engineers, etc. The directors are:—C. Orringe and J. W. Hunter, both of 26, Cloth Market, Newcastle-on-Tyne. Solicitors: Frank Kirby & Co., Newcastle-on-Tyne.

Barrow Radio, Ltd.—Private company. Registered October 22nd. Capital £3,000 in £1 shares. Objects:—To carry on the business of receivers, distributors and relayers of radio, television and other programmes, radio engineers and manufacturers, etc. The directors are:—J. Sutcliffe, "Nethertack," Dane Avenue, Barrow-in-Furness; and G. H. Morris, 217, Dalton Road, Barrow-in-Furness. Secretary: J. Sutcliffe. Registered office: 217, Dalton Road, Barrow-in-Furness.

Prompt Radio Supplies, Ltd.—Private company. Registered October 22nd. Capital £100 in £1 shares. Objects:—To carry on the business of manufacturers of and dealers in radio apparatus and instruments of all kinds, etc. The directors are:—A. Horowitz, 19, Hertford Street, W.1; and B. Byfield, 49, Kenton Gardens, Kenton.

Detex (1931), Ltd.—Private company. Registered October 24th. Capital £500 in £1 shares. Objects:—To carry on the business of manufacturers of and dealers in radio, television, and electrical instruments, etc. The subscribers are:—Molly E. Newman, 7, Toronto Road, Ilford; and W. O. Jones, 10, Weigall Road, Lee, S.E.12. The first directors are to be appointed by the subscribers. Secretary: W. G. Johnson. Registered office: 10, White Lion Street, Bishopsgate, E.1.

Car and Electrical Services, Ltd.—Private company. Registered October 21st. Capital £1,000 in £1 shares. Objects:—To carry on the business of general engineers, electricians, garage proprietors and coach builders, manufacturers and repairers of and dealers in automobiles, electrical apparatus, radio and television equipment, etc. The directors are:—A. Kelcey, 5, Hillcrest Road, Maidstone Road, Chatham; and W. H. Hawkins, 17, Pheasant Road, Chatham. Registered office: 5, Hillcrest Road, Maidstone Road, Chatham, Kent.

Macks Auto-Electric Co., Ltd.—Private company. Registered October 24th. Capital £2,000 in £1 shares. Objects:—To acquire the business of Macks Auto-Electric (1925) Co. hitherto carried on by J. Mack at 46, Madoc Street, Llandudno, and to carry on the business of manufacturers of, agents for, and dealers in wireless apparatus, electrical fittings and accessories, gramophones and records, etc. The subscribers are: J. Mack, Bowgate, St. Anrew's Place, Llandudno; and W. S. Adams, 16, Church Walks, Llandudno. J. Mack is the first and permanent governing director.

Phonexpress, Ltd.—Private company. Registered October 24th. Capital £100 in £1 shares. Objects:—To carry on the business of manufacturers of and dealers in electrical apparatus, telephones, wireless sets and accessories, motor cars and accessories, etc. The directors are:—H. L. Welch, 210, Sheen Road, Richmond; and W. L. Norman, 125, The Grove, Wandsworth, S.W.18. H. L. Welch is a director for life. Registered office: 31, Queen Street, Hammersmith, W.

Fullagar, Ltd.—Private company. Registered October 26th. Capital £800 in £1 shares. Objects:—To acquire the business of a gramophone and record dealer now carried on by J. Fullagar at 49, St. Peter's Street, Canterbury, Kent, as "James Fullagar," and to carry on the same and the business of radio and electrical engineers, etc. The directors are:—G. Fullagar, jnr. (permanent), Bleak House, South Road, Canterbury; and R. E. Brown, 54, St. Dunstan's, Canterbury. Registered office: 49, St. Peter's Street, Canterbury, Kent.

Returns of Electrical Companies

Stuart Turner, Ltd.—Satisfaction in full on October 8th, 1931, (*a*) of mortgage dated November 16th, 1922, and registered December 6th, 1922, and (*b*) of mortgage dated May 16th, 1931, and registered May 26th, 1931. (According to the register of mortgages, the mortgages registered December 6th, 1922, and May 26th, 1931, originally secured all moneys due or to become due from the company to the London County Westminster & Parrs Bank, Ltd., and the Westminster Bank, Ltd., respectively.)

M. W. Woods, Ltd.—Two charges, (*a*) on land with engineering workshops, sheds, buildings and erections thereon in Princess Street, Colchester, and (*b*) on land and buildings in Denmark Street, Burlington Road and Butt Road, Colchester, both dated October 10th, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd., not exceeding £1,000 and £2,000 respectively.

Concordia Electric Safety Lamp Co., Ltd.—Capital, £30,000 in £1 shares (increased from £4,000 in November, 1930). Return dated March 31st, 1930. 3,000 shares taken up. £3,000 paid. Mortgages and charges, nil. Return of allotments show a further 9,250 shares allotted, payable in cash and fully called up between November 11th, 1930, and June 18th, 1931.

British Columbia Electric Railway Co., Ltd.—Satisfaction in full on or before July 9th, 1931, of trust deed dated February 19th, 1924, and registered February 25th, 1924, securing £777,000 5 per cent. (income tax free) 1,944 debenture stock.

M.S.L., Ltd.—Capital, £500 in £1 shares. Return dated August 10th, 1931. All shares taken up. £500 paid. Mortgages and charges, nil.

Engineering and Lighting Equipment Co., Ltd.—Further charge on "Sphere Works," St. Albans, Herts, dated October 13th, to secure £1,011. Holders: City of St. Albans Permanent Building Society, 9, St. Peter's Street, St. Albans.

Great Eastern Radio, Ltd.—Issue on September 25th, 1931, of £1,000 debentures, part of a series already registered.

Vabest Co., Ltd.—T. H. Fraser, of 11a, Hart Street, Bloomsbury, was appointed receiver and manager on October 13th, under powers contained in debenture dated May 1st, 1924, July 30th, 1924, and December 6th, 1924.

Notting Hill Electric Lighting Co., Ltd.—Satisfaction in full on or before October 15th, of debenture trust deed dated June 17th, 1897, and the supplemental trust deed dated June 30th, 1902, and registered May 20th, 1903, and February 19th, 1904.

Electric Light Insurance and Maintenance Co., Ltd.—Issue on October 20th of £500 8 per cent. second mortgage debentures, part of a series already registered.

Currys, Ltd.—Further charge on freehold premises in High Street and Gibb Street, Long Eaton, Derby, dated October 13th, to secure £1,130. Holders: Bradford Third Equitable Benefit Building Society, 48, Market Street, Bradford.

Jobson & Beckwith, Ltd.—Debenture dated October 3rd, to secure £1,000, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: Mrs. L. Williams, St. John's Lodge, Chase Road, Southgate, Middlesex.

Loud Speaker Co., Ltd.—G. D. Haynes, of 93, Mortimer Street, W.1, ceased to act as receiver and manager on October 19th.

E. H. Maisner & Co., Ltd.—Land registration charge on 4, Attneave Street, Clerkenwell, dated September 3rd, 1931, to secure all moneys due or to become due from the company to Barclays Bank, Ltd. (Registered October 20th by permission of the Court.)

Symondsbury Electric Lighting Co., Ltd.—Capital £2,000 in £5 shares. Return dated May 26th, 1931. 244 shares taken up. £1,220 paid. Mortgages and charges, nil.

Chelsea Electricity Supply Co., Ltd.—Capital £450,000 in 420,000 ordinary and 30,000 preference shares of £1 each. Return dated April 23rd, 1931. 404,477 ordinary and 30,000 preference shares taken up. £218,850 paid on 188,850 ordinary and 30,000 preference shares. £215,627 considered as paid on 215,627 ordinary shares. Mortgages and charges, £72,380.

Ericsson Telephones, Ltd.—Capital £500,000 in 199,970 preference and 300,030 ordinary shares of £1 each. Return dated May 13th, 1931. All shares taken up. £269,980 paid (being £1 per share on 199,970 preference and 50,010 ordinary and 8s. per share on 50,000 ordinary). £230,020 considered as paid (being £1 per share on 200,020 ordinary and 12s. per share on 50,000 ordinary). Mortgages and charges, £50,000.

Paignton Electric Light and Power Co., Ltd.—Capital £70,000 in £1 shares. Return dated March 24th (filed April 1st, 1931). 60,000 shares issued and fully paid up. Mortgages and charges, nil.

Bergmann Electric Co., Ltd.—Capital £5,000 in £1 shares. Return dated May 28th, 1931 (filed June 2nd). 701 shares taken up. £701 paid. Mortgages and charges, nil.

Excelsior Electric Cleaner Co., Ltd.—Capital £5,000 in £1 shares. Return dated December 1st, 1930 (filed April 20th, 1931). All shares taken up. £5,000 paid. Mortgages and charges, nil.

City Notes

The Central Argentine Railway Co., Ltd., held its annual meeting on October 22nd, Mr. H. A. Vernet presiding in the absence of Lord Forres (chairman). In the course of his speech Mr. Vernet said that, compared with the preceding financial year, the gross receipts for the past year decreased by £371,058, the reduction being largely due to a falling-off in passenger earnings, which were down by £316,523. The electrification of the branch to Tigre was completed in May, and the electrification of the suburban section ending near Villa Ballester was practically completed and was in partial operation. This electrification work had cost nearly £4,000,000. In view of the conditions which had arisen, every effort had been made to diminish or slow down capital expenditure. As regarded the electrification work, the electrical equipment had been contracted for and much of it paid for before the work *in situ* was completed, and to suspend the completion of such work would have been uneconomical. Work on two short branches recently opened to traffic had also progressed to a point where it would have been wasteful to suspend it. With regard to the extension from Villa del Rosario and Cordoba to Forres, on the Tucuman line, considerable work had been done, and 64 miles of the extension had been opened to traffic. It was hoped that conditions would not be such as to compel the total suspension of construction at a time when the remaining cost to complete was not more than, say, £600,000 out of a total of £3,900,000. The completion of the electrification was a necessity if adequate results were to be realised from what had already been undertaken. The report and accounts were adopted.

Erinoid, Ltd.—At the recent annual meeting, Mr. A. Binnie (chairman), who presided, said that owing to the exceptional depression, the sales had been rather less in quantity and the selling price somewhat lower during the year under review, than in the previous eleven months. Economies in the process of manufacture, and in other directions had been made. Their holding in the two French Erinoid companies had been sold. The recent fall in the value of sterling would affect the company to some extent, but mainly in its favour. They had every reason to believe that the coming year would show better results, as for the ten weeks to October 10th, both sales and profits showed a gratifying increase. The report and accounts were adopted.

Telephone Properties, Ltd., whose registration was recorded in our issue of August 14th (p. 262), has published its statutory report showing that 136,975 eight per cent. cumulative preference and 410,932 ordinary shares of £1 each have been allotted. All of these with the exception of seven ordinary shares have been allotted as fully paid up in consideration of the transfer by the Venezuela Telephone and Electrical Appliances Co., Ltd., of its assets and undertaking to the company. The amount of the preliminary expenses is put at £5,000.

Companies Struck Off the Register.—The following companies have been struck off the Register and are thereby dissolved :—

Comparri Wireless Control Syndicate, Ltd.
Electrical Units, Ltd.
Electrozone Co., Ltd.
Ever-lite Changeable Signs, Ltd.
Everlite, Ltd.
Fylde Electric Co., Ltd.
Knivetown Electric Wire Co., Ltd.
Saunders Electrical Co., Ltd.

The Western Union Telegraph Co., Inc., reports gross revenues of $85,261,972 for the nine months ended September 30th (September estimated), as compared with $102,026,807 in the corresponding period of the preceding year. Total expenses were $75,622,603, against $91,437,970, and after deducting interest on bonded debt, there was a net income of $5,621,333 ($6,880,930).

The American Telephone & Telegraph Co. reports that for the nine months to September 30th the total earnings were $219,100,176, as compared with $217,713,601 in the corresponding period of 1930. The net earnings were $152,166,533, against $148,090,194, and after meeting interest and dividends there was a balance of $6,809,426 ($22,330,852).

The Hydro-Electric Securities Corporation, in its report for the quarter ended September 30th, shows a net ordinary income of $790,245, as compared with $1,043,028 for the corresponding quarter of 1930, or $0.35 per common share (against $0.52). The net extraordinary income for the first nine months of this year was $395,069 (or $0.26 per common share).

The Ever-Ready Company (Great Britain), Ltd., has declared interim dividends for the half-year ended September 30th at the rate of 10 per cent. per annum on the preference shares and 10 per cent., actual, on the ordinary shares. The directors announce the continued expansion of the business since April 1st, sales being substantially in advance of those of the corresponding period of the previous year.

The Electrolytic Zinc Co. of Australasia, in its report for the year ended June 30th last, states that the gross profit was £76,724, and the net profit £5,678, to which was added £1,322 brought forward, making £7,000 available, which is carried forward. The report states that the decrease in profits is due almost wholly to the unprecedented fall in metal prices.

The Central Electricity Board, which recently placed privately £1,000,000 of 5 per cent. stock, 1950-70, is reported to have made arrangements for placing a further £1,000,000 of the same stock. This new stock will rank with the existing stock and will carry the full six months' dividend due on March 1st next.

The Craigpark Electric Cable Co., Ltd., has announced an interim dividend of 4 per cent. on the ordinary shares. No interim dividend was paid last year, but there was a final distribution of 10 per cent.

Joseph Lucas, Ltd., held their annual meeting on Monday last when Ald. H. J. Sayer (chairman), in reviewing the past year's activities, said that the P. & H. and M.-L. businesses had been reorganised. In addition, they had completed an agreement with the Bosch Co. of Stuttgart, which had meant an alteration in the status of the C.A.V. Co. and a regrouping of its assets. The works of M.-L. at Coventry had been closed down and the whole of their plant and manufacture transferred to the company's other electrical works. They had rearranged production of the P. & H. business in conjunction with their own lamp works so that the best use could be made of both. New companies under the style of P. & H., Ltd., and M.-L., Ltd., had been registered, which were acting as sales companies only.

The Amazon Telegraph Co., Ltd., reports a gross revenue, including a profit of £8,522 realised on investments, of £43,450, and working expenses of £28,901. After providing for debenture interest and income tax, there is a balance of £12,450. The outstanding 5 per cent. debentures, amounting to £51,900, were paid off during the year at a cost of £54,495. After charging this against revenue account, adding the debit balance of £13,439 brought forward from last year and deducting the credit balance of £12,450 for the current year, there is a deficit of £55,484. This has been met by transferring £60,289 from general reserve, leaving a credit balance of £4,805 to be carried forward. Meeting : November 5th.

The Atlas Electric and General Trust, Ltd., reports a total income of £283,630 for the year ended March 31st last, as compared with £295,297 in the preceding year. After transferring £10,000 from taxation reserve and deducting all charges, there is a balance of £233,660, as against £283,819. A final dividend of one per cent. is recommended on the ordinary shares, making three per cent. for the year (against five per cent.), leaving £33,378 (£33,843) to be carried forward. Meeting : November 5th.

Imperial and International Communications, Ltd., report that the estimated traffic receipts for the nine months ended September 30th last were £3,506,265, as compared with £4,080,171 for the corresponding period of 1930, a decrease of £573,906. In comparing aggregates, allowance must be made for the changed conditions of sharing traffic.

Glenfield & Kennedy, Ltd., have announced an interim dividend of 4 per cent., less tax (same), on the ordinary shares.

The Urban Electric Supply Co., Ltd., has announced an interim dividend of 3 per cent. on the ordinary shares (same).

The Para Electric Railways and Lighting Co., Ltd., states that interest on the debenture stock for six months to November 30th will not be paid on December 1st.

Stocks and Shares

Tuesday Evening.

Writing on the polling-day of a General Election, the result of which is certain to have so marked an effect upon all branches of finance, as well as other interests of the community, it is difficult to do more than indicate the disposition of stocks and shares as it has come to a head on the day of the contest. Stock Exchange and City opinion looks with confidence to the result proving a substantial victory for the National Party.

Prices are well maintained. The strength of shares in the electrical manufacturing and equipment group continues to be marked. The statement that anticipation looks for imposition of some kind of tariff can be made, in this column, impartially, and with no political bias. The effect of this impression is to impart firmness to the prices of shares in such companies as those that are considered likely to benefit.

Gilt-edged Stocks

In the gilt-edged markets there is noticeable a readiness to take stock of the prior-charge issues, such as debenture, guaranteed and preference stocks, of the railway companies. Two of the latter have published somewhat grandiose plans designed to give, amongst other things, employment for a small army of workers. Part of the money is to be spent upon electrification schemes, and, if the plans are put into operation, they are likely to call for useful contracts from suppliers of electrical machinery, etc.

Central Board 4½ per cent. debenture stock has gone back to 98, which brings it within 10s. of the price of the 4½ per cent. debenture stock of the London & Home Counties. The Central Board has just made a further issue of stock, and of this there can be obtained in the market a fair amount at 95¾, at which the yield is £5 4s. 6d. per cent. on the money. The stock bears date 1950-1970, and it can be bought free of stamp and fee. A few pence more per cent. is offered by North West Midlands Authority 5 per cent. stock, bearing the same date and obtainable at 95 free of stamp.

Provincial Electricity Supply

Leading electricity supply companies which operate in the industrial areas, e.g., the Newcastle, Yorkshire, Clyde Valley, Lancashire, and Scottish Power Companies, are beginning to show signs of activity. A further impetus would be given to this movement if tariffs became an accomplished fact. On the ordinary shares of the first four named, the dividend offers a yield of a little over 5 per cent. on the money. On the Scottish Power Company shares the return is more, because the company, being a younger concern, has not yet had time to build up such large reserves as, for instance, the Clyde Valley has done.

County of London ordinary shares are better at 43s. 9d., and Metropolitans strengthened to 40s. Amongst the provincial shares, modest rises have occurred in Midland Counties at 28s. 3d., Midland Electric Power Distribution at 27s. 6d.,

and Yorkshires at 32s. As a whole, the market shows a good deal of firmness, and buyers again are on the lookout for cheap stock.

Atlas Trust

Atlas Electric and General Trust ordinary shares have been fairly active around 13s. 9d., and the 7 per cent. preference at 20s. 6d., after both shares had been lower on the recommendation of a final dividend on the ordinary shares of 1 per cent., making 3 per cent. for the year ended March 31st last. The total dividend is 2 per cent. less than was that for 1929-1930, when 5 per cent. was paid. The report shows a disposable balance of £233,660, or about £50,000 less than that in the previous year. To the former amount must be added £33,800 brought in. After payment of the dividend of 3 per cent. for the past year, there will be £33,378 left to go forward. The credit value of the investments held at the date of the last balance sheet showed a depreciation of about 12½ per cent. on the total at which they stand in the balance sheet, but there is a capital reserve which covers this depreciation. The meeting is to be held on November 5th. It had been hoped in the market that the company would be able to pay at any rate 4 per cent. for the year, but, after consideration of the report, and the figures which it presents, the opinion gained ground that the directors had done as much as could be expected of them in paying 3 per cent. for the year.

Two Hundred Points Rise

The principal movement in our price lists this week is an advance of 200 points in British Electric Traction deferred stock. From 600 the price rose to 800, and there has been a fair amount of business in the stock. It will be remembered that at the last meeting of the company a scheme was proposed by the chairman for making a bonus issue of debentures with 3 per cent. interest, but also with a 3 per cent. sinking fund. Further proposals were to be detailed some time this autumn, but consideration of these had been deferred until the year finishes next March. The company announces that this decision has been reached by reason of external affairs, and not internal. The price of the company's 8 per cent. preferred ordinary has recovered 7 points to 112. The rise in the price of the deferred stock came about for the same reasons as those that have been instrumental in strengthening the Home Railway market. Moreover, it is a reasonable assumption that at 600 the price stood unduly low in view of the present financial position of the company and of its future outlook.

Manufacturing and Equipment Shares

Something of a setback occurred in the prices of the leading shares in this section, but the losses were promptly recovered, and in some cases further improvements have been secured over those of the last three weeks. Enfield Cables, for instance, at 4¼, are 5s. higher. British Aluminium have risen to 31s. 3d. Henleys, after a decline to 5¾, recovered to 5⅞. Siemens put on 2s. at 24s. 6d. A further rise of 10s. lifted Telegraph Constructions to 15, but the price reacted to 14½. No details have yet been received, up to Tuesday in this week, of the reported negotiations to which reference was made here last week, concerning the anticipated offer, by another company, for Telegraph Construction shares. Mysterious movements have occurred in Indiarubber shares. From 5s., the price rose to 8s. 9d., from which latter figure it reacted to 6s. 3d., leaving a gain on the week of 1s. 3d. per share. General Electrics have strengthened to 47s. 6d. Associated Electrical Industries ordinary retain, at 25s., their rise of 3s. 9d. of a week ago, and the 8 per cent. preference at 27s. 6d. are 1/16 higher. Reactions in the prices of Callenders and British Insulated were promptly recovered. Brush has risen 5 points to 60: business was marked on the first business day of this week at 52. The company's 4½ per cent. first debenture stock stands at 72½. This stock, like the company's second debenture stock, which is quoted at 67, is perpetual.

Cables and Wireless

Cables & Wireless stocks, after a sharp shake-out following upon their pyrotechnical rises of last week, recovered their losses in full. The 7½ per cent. "A" ordinary stock is, indeed, 2 points higher, at 25, and the preference, which gained 13 points last week, is a further 10s. better. The September figures published early this week are the best since last March, and show a very substantial improvement over those of August. Reference has already been made here to the expectation that the preference stock will receive its full 5½ per cent. dividend next March, and to the bare possibility of the ordinary stock also getting a modest distribution. Of this latter there would appear to be little chance, unless, of course, the traffics should improve by leaps and bounds. That this is possible no one will deny, and even at 25, the present price, the "A" ordinary stock looks to be a good purchase as what the Stock Exchange calls option money.

Brazilian Tractions, among the dollar stocks, are higher at 15½, and Rio Tramways 5 per cent. mortgage bonds rallied 2, to 69½. Mexicans give no sign of regaining their recent heavy falls. Pennsylvania Water shares are 67½. Power Corporation of Canada weakened to 40½, while Montreal shares kept at 42½, and Shawinigan moved up to 35½.

In the home iron, steel, and engineering group, Babcocks developed fresh strength at 54s. 6d. and Vickers at 10s. 3d. Others of similar class are also better. There is still no vitality amongst rubber shares.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1929.	1930.	Price, Oct. 27, 1931.	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES						
Bournemouth and Poole	£ 1	15	15	58/9	—	5 2 2
Brompton Ordinary	1	8½	8½	27/6	—	5 1 0
Central Electricity 4½% Deb.	Stock	—	4½	88	−1½	5 2 3
Charing Cross Ordinary	1	8½	8½	29/0	—	4 16 7
Chelsea	1	8½	8½	26/-	—	5 7 8
City of London	1	10	10	35/-	—	5 14 3
Clyde Valley	1	8	8	32/-	—	5 0 0
County of London	1	11	11	43/9	+6d.	5 0 6
Edmundsons' 7% Pref.	1	7	7	24/6	—	5 14 3
Elec. Supply Corporation	1	11	11	42/6	—	5 3 6
Kensington Ordinary	1	8	8	29/-	—	4 16 7
Lancs. Light and Power	1	7	6½	25/-	—	5 4 0
London & Home Counties 4½% Deb.	Stock	—	—	87½	—	5 2 10
London Electric	1	8½	9	32/6	—	5 10 9
Metropolitan	1	9	10	40/-	+⅛	5 0 0
Midland Counties	1	6½	7	28/3	+9d.	4 19 1
Mid. Elec. Power	1	15	8	27/6	+⅛	5 16 5
Newcastle-on-Tyne Ordinary	1	6	6	23/9	+6d.	5 1 1
Do. 7% Pref.	1	7	7	25/-	—	5 12 0
Notting Hill 6% Pref.	10	6	6	10½	—	5 14 3
North Met. Elec. 6% Pref.	1	6	6	22/-	—	5 9 1
St. James' and Pall Mall	1	8	8	29/-	—	4 16 7
Scottish Power	1	8	8	27/6	—	5 16 4
South London	1	8½	8½	26/6	—	5 5 8
Urban Ordinary	1	7	7	27/6	—	5 1 10
Westminster Ordinary	1	8½	8½	28/-	—	5 0 0
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	21/6	—	6 19 6
Yorkshire Elec.	1	8	8	32/-	+9d.	5 0 0
HOME RAILS						
Central London Ord. Assented	Stock	4	4	70½	—	5 13 6
Metropolitan	,,	4	3½	39½	—	8 17 3
Do. District	,,	5	5	63½	—	8 8 0
Underground Electric	1	8	8	19/-	−6d.	8 8 6
TELEGRAPHS AND TELEPHONES						
Anglo-Am. Tel. Pref.	Stock	6	6	93	−1	6 9 0
Do. Def.	,,	1½	1½	23	—	6 10 5
Cables & Wireless 5½% Pref.	Stock	5½	5½	63¼	+½	—
Do. A 7½% Ord.	,,	Nil	—	25	+2	—
Do. B Ord.	,,	Nil	—	15	−¼	—
Globe Tel. and T. Ord.	10	10	8½	9	+½	—
Do. do. Pref.	10	6	6	9	+½	6 13 4
Great Northern Tel.	10	20	20	23	+1½	8 14 0
Marconi-Marine	1	15	15	36/3	+6d.	8 5 6
Oriental Telephone Ord.	1	12	12	2⅛	−⅛	*5 16 3
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	5½	—	7/6	—	—
Do. do. 2nd Pref.	5	6	—	6/3	—	—
Do. do. 5% Deb.	Stock	5	5	12½	+1	—
British Electric Traction Def. Ord.	,,	5	5	800	+200	—
Do. do. Pref. Ord.	,,	8	8	112	+7	7 2 10
Brazil Traction	100	8	—	15½	+¾	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	90½	—	5 10 6
London & Sub. Trac. 5% Pref.	1	Nil	Nil	8/3	—	—
London United Tram Deb.	Stock	4	4	57½	−3	6 19 2
Mexico Trams, 5% Bonds	—	5	5	25	—	20 0 0
Mexican Light Common	100	Nil	Nil	20	—	—
Do. 7% Pref.	100	7	7	35	—	20 0 0
Do. 1st Bonds	—	5	5	45	—	11 2 2
Victoria Falls Ord.	1	15	15	58/9	—	5 2 2
Yorkshire (West Riding)	1	Nil	Nil	6/3	—	—
MANUFACTURING COMPANIES						
Assoc. Elec. Ord.	1	6	6	25/-	—	4 16 0
Do. Pref.	1	8	8	27/6	+⅛	5 16 5
Babcock & Wilcox	1	15	14	54/6	+9d.	*5 2 9
British Aluminium Ord.	1	10	10	31/3	+⅛	6 8 0
British Insulated Ord.	1	15	15	3	—	5 0 0
Brush Ord.	Stock	10	5	60	+5	8 6 8
Callender's	1	15	15	3xd	+9d.	5 0 0
Do. 6½% Pref.	1	6½	6½	22/6	—	5 15 7
Crompton Parkinson Ord.	5/-	30	30	22/6	—	6 13 4
Do. 8% Pref.	1	8	8	28/3	—	5 13 3
Edison-Swan 1st Pref.	1	7½	7½	23/3	—	6 9 0
Do. 5% Deb.	Stock	5	5	92½	—	5 8 1
Electric Construction	1	5	Nil	12/6	+½	—
Enfield Cable Ord.	1	25	25	4¼	+¼	5 17 8
English Electric	1	Nil	Nil	8/9	+⅛	—
Do. do. Pref.	1	Nil	Nil	7/6	—	—
Ferranti Pref.	1	7	7	20/3	+6d.	6 19 8
G.E.C. Pref.	1	6½	6½	23/-	—	5 13 1
Do. Ord.	1	14	10	47/6	+⅛	4 4 5
Henley's	1	30	30	5¾	−⅛	5 2 9
Do. 4½% Pref.	5	4½	4½	4½	—	5 6 0
India-Rubber	1	Nil	Nil	6/3	+⅛	—
Johnson & Phillips	1	10	10	27/6	—	7 5 6
Siemens Ord.	1	7½	7½	24/6	+2/-	6 2 5
Telegraph Construction	12	10	7½	14½	—	6 4 0

* Dividends paid free of Income Tax.

China's Electrical Future

National Construction Commission: Slow but steady development

CHINA has not kept pace with the rest of the world in electrical constructive effort. Less than 600,000-kW of generating equipment has been installed in the past thirty years and this total is made up by some 575 scattered generating plants, which include the Shanghai undertaking with an installed capacity of 161,000 kW. In order to supervise existing undertakings and intelligently to direct the future electrification of the country the National Government some time ago created the National Construction Commission with full powers and it has drawn up an ambitious programme to be carried out in five periods of five years each. The first stage involves the installation of 607,000-kW of plant, while at the end of the fifth period the total generating capacity is to be 5,000,000 kW.

Future Prospects

According to Mr. George Bronson Rea, writing in the *Far Eastern Review*, at first glance the programme seems idealistic, but if a twenty-five-year period of peace be assumed the industrial needs and advance of the country will, it is considered, fully justify it. But Dr. Dettmar, who visited China last year as a member of the German Industrial Mission and conducted a thorough investigation of the possibilities of the market for German electrical machinery manufacturers, lays stress in his report on many obstacles that must be overcome before China can hope to extend her present power supply along the lines laid down by the National Construction Commission. The main obstacle to rapid growth is the absence of any demand for power, which can be created only by the industrial growth of the country. He however anticipates gradual development of existing plant for house lighting, ventilating fans, and small motors; there are also several good possibilities for the use of power in coal mines, especially for transportation to the main lines of the railways.

The report, while emphasising the drawbacks, is optimistic regarding the gradual improvement of the market for electrical equipment and accessories. On the other hand Mr. Rea considers that if foreign capital is to participate in this development, the regulations governing private electrical enterprises in China will have to be repealed, or revised, as at present such participation is prohibited

Water Power

Meanwhile the National Construction Commission is developing the Nanking, Tsishuyen, and the Hangchow power stations, and is carrying out a scheme for the Kiangsu and Chekiang regions, but it has deliberately isolated the great Shanghai plant. The Chinese are by no means asleep to the possibilities of water power development. Perhaps the most important of such schemes is the one for utilising the Yung River in the Province of Kwantung, which is stated to be sufficient to supply not only the electrical requirements of the City of Canton, but of the whole province. A scheme for the installation of initial plant of 60,000-kW capacity has been drawn up by a Canadian concern and is at present under consideration. The National Construction Commission is also engaged on the preliminary plans for utilising the Yangtze River at Sanshien and the Yellow River at Langme, and is also collecting records and data concerning other large rivers in order to obtain information regarding further possible hydro-electric installations

Colliery Development

Mr. Rea considers that several promising electrification schemes might be realised by the erection of power stations at collieries throughout China. The possibilities in this direction are indicated by the extensive power development which is taking place at the Fushun mines in Manchuria by utilising unmarketable waste and pulverised coal. If political problems between China and Japan can be settled, it is within the realm of possibility that the Fushun plant will become the centre of a system that will embrace the whole of South Manchuria.

Conditions are somewhat similar at Kailan, where the Mining Administration is already electrifying its own railway transport facilities between the mines and the shipping port of Chinwangtao and it is considered that the scheme might easily be extended to an important section of the Peiping-Liaoning railway, and to supply the cities of Tientsin and Peking with light and power.

In summing up, Mr. Rea states that China offers a brilliant field for the electrical engineer and that, although progress will be slow, it will be steady. Everything depends on internal peace and the stabilisation of authority under a central government.

Kowloon Undertaking

Occupying a prominent position on the foreshore of Kowloon Bay, the generating station of the China Light & Power Co. (1918), Ltd., is one of the conspicuous landmarks noticeable on approaching Hongkong from the eastward entrance to the harbour. The company supplies electricity on the Kowloon Peninsula and to the new territories.

For the year ended September, 1929, the output amounted to 16,573,476 kWh, with a maximum recorded load of 4,750 kW. Messrs. Preece, Cardew & Rider were appointed consulting engineers, and it was decided to change over the system from 2,200 volts 60 cycles to 6,600 volts 50 cycles to conform to standard British practice. The work of changing the consumers' voltages from 110/220 to 200/350 is now practically complete and the plant now comprises two B.T.-H. sets, each of 5,000 kW; one M.-V. set of 5,000 kW, one B.T.-H. set of 3,000 kW, two B.T.-H. sets of 750 kW, two Brush frequency changers, each of 1,500 kW, two Greenwood & Batley turbo-generator d.c. house sets, and one motor-generator of 50 kW for station lighting and operating the oil switches. Each of the two new 5,000-kW sets consists of a horizontal steam turbine of the impulse type directly coupled to a three-phase alternator and exciter, designed to work at a steam pressure of 190 lb. per sq. in., superheated to a total temperature of 584 deg. F.

The feeders are 3-core, paper-insulated, lead-sheathed and armoured cables laid direct in the ground and covered with protective tiling, sub-station control being effected by switchgear of the Reyrolle armourclad type. By arrangement with the Hongkong Government a 22-kV overhead transmission line is being erected in the new territories on lattice steel towers, galvanised throughout, of the same general design as those for the "grid" scheme in England. The line passes over exceedingly hilly and broken country for the greater part of its length; over paddy fields and flat country the average span is 460 ft., but in the hills the average is 700 ft.

The conductors consist of seven-strand cadmium copper and owing to the humidity of Hongkong the insulators are designed for a working pressure of 33,000 volts; a continuous galvanised steel earth wire is fixed to the top of each tower. The construction of the line has been carried out by Callender's Cable & Construction Co., Ltd., which has also supplied the underground cable and poles for the 6,600-volt lines.

The number of consumers has approximately doubled during the last five years and now totals over 17,000. When the electrification of the Green Island cement works is complete an annual output of about 30,000,000 kWh is expected.

Argentine Electrical Imports

THE Argentine Government has recently issued statistics of the country's foreign trade during 1930. The following table shows either the weights or numbers or the values in gold pesos (about 4s.), of the various descriptions of electrical materials imported in that year, and the figures are compared with those for 1929. The values are those of the Argentine Customs Department.

	1929.	1930.	Inc. or dec.
Cables, not covered with lead or silk (metric tons)	1,970	2,670	+ 700
Ditto, lead covered (metric tons)	1,887	4,284	+ 2,397
Ditto, silk covered (metric tons)	5	6	+ 1
Ditto, duty free (metric tons)	590	1,175	+ 585
Flex, electric (metric tons)	78	80	+ 2
Dynamos and motors (metric tons)	5,150	5,660	+ 510
Fan motors (number)	27,570	36,530	+ 8,960
Accumulators and accessories (metric tons)	2,588	2,528	— 60
Dry batteries (metric tons)	3,962	3,583	— 379
Ammeters and voltmeters (number)	11,266	9,644	— 1,622
Wireless telephone apparatus (gold pesos, 000)	1,890	1,430	— 460
Wireless telegraph apparatus (gold pesos, 000)	6	3	— 3
Other telephone material and apparatus (gold pesos, 000)	331	800	+ 469
Other telegraph material and apparatus (gold pesos, 000)	103	86	— 17
Switches, cut-outs, circuit breakers, &c., entered by weight (metric tons)	1,043	575	— 468
Switches (entered by number) (gold pesos, 000)	11	20	+ 9
Electric bells ,, ,,	63	57	— 6
Insulating tape (metric tons)	125	108	— 17
Switchboards for bells & telephones (gold pesos, 000)	14	17	+ 3
Vulcanised fibre ,, ,,	28	37	+ 9
Incandescent lamps (metric tons)	918	790	— 128
Meters (number)	12,020	6,210	— 5,810
Distribution boards (number)	909	982	+ 73
Insulating tubes (metric tons)	4,742	4,380	— 362
Unspecified materials (gold pesos, 000)	1,658	1,628	— 30

Indian Electrical Notes

(From Our Own Correspondent)

Mettur Scheme Progress

CONSIDERABLE progress is recorded on the Mettur scheme in Madras. At present the general level of the dam towards the river is 60 ft. above the river bed, and it rises considerably towards the western flank. Up to date 14½ million cu. ft. of masonry has been laid in this section, and the erection of low and high level sluices is in progress.

Good progress has also been made on the left flank and the portion from 600 to 900 ft. has been raised to a height of 75 ft. It is hoped to raise the section of the dam from 1,140 to 1,700 ft. by another 37 ft. during the course of next year. Four sets of pipes are built into the dam towards the left flank. The pipes will operate with a head of water varying from 60 ft. to 160 ft. according to the storage in the reservoir, and each pipe will provide from 5,300 to 15,000 h.p. between these two heads of water. The total amount of energy developed will be 33,000 h.p.

Orders for Railways

It is reported that for the railways in South India, a number of interesting orders have been received by the General Electric Company. Among these are a number of complete station-lighting schemes, floodlighting for yards, a 350-kW Diesel engine generating set, 1,000-kVA transformers, and 22,000-V transformers and switchgear. This last order is interesting as it incorporates 22,000-V compound-filled metal-clad switchgear, which is believed to be the first installation of its kind at so high a voltage in India. The electrification of railways has made a good start on the South Indian surburban service in Madras.

Supply to Planting Districts

The supply of hydro-electric power from the Pykara project to the tea factories in Southern India is being discussed, and the Glen Morgan scheme has begun to supply power. The usual method of driving a tea factory hitherto, where water power has not been available, has been by suction gas engines using charcoal-producer gas. This suffers from the fact that at higher altitudes, 5 to 10 per cent. of power is lost for every 1,000 ft. above sea level. In addition, the supply of wood in many districts has become very scarce. For this reason the supply of cheap electric power on a large scale to the tea factories will prove a boon to the planting community. The English Electric Company has taken a lead in the supply of transformers and motors to enable the tea factories to adopt the electric drive.

Cable Protection Inquiry

Before the Indian Tariff Board which is now conducting an inquiry in Madras into the question of protection to the electrical cable industry, Major Howard, who is Chief Engineer for Hydro-Electric Development in the Madras Presidency, protested against granting protection to electrical cables and wires. He said that conductor cost was a serious item in any transmission line estimate. In the case of the Pykara scheme the proportion of cost varied from 10.8 per cent. from small lines, to 22.3 per cent. for more important lines, with an average of 17.3 per cent. Any appreciable increase might render extensions into rural areas unprofitable and retard development.

Effects of Tariff

The 15 per cent. tariff suggested would result in a 4.5 per cent. increase in power rates. To this should be added the effect of any other duty which might be contemplated on steel poles and towers, meters, insulated wires and electrical equipment in general. Referring again to the distribution system, the percentage cost of conductors to the total investment varied widely, and might be taken as approximating to 10 per cent. for small overhead systems, excluding the generating plant, and a very much higher percentage for the underground system. Taking the Pykara scheme as a whole and including the distribution system now contemplated, the total cost of line conductors c.i.f. would be about Rs. 8,50,000. The additional cost to the Government would thus be about Rs. 1,27,000. If the tariff on copper wire and cables rendered their use uneconomical, then aluminium or copper-clad steel cables would be used unless a tariff was also placed upon them. Other conductors which were marketed under various names might also come into use.

Rates and Extensions

In his evidence, Major Howard stated that in the present schemes of electric supply in the Presidency, they did not expect any profit for a number of years and that a protective duty would make the situation worse, and the town and rural distribution schemes might not be taken up, as the Madras Government had drawn up a schedule of rates according to which distributing authorities could not sell electricity at a higher rate. Referring to the Coimbatore distribution system, Major Howard said that at first there would be a demand for 25,000 kWh, which would rise ultimately to 1½ million kWh. The whole project was so designed that there would be a very small margin of profit and it was intended mainly to make electricity popular in rural areas. As regarded orders for electric cables and wires for the Pollachi Annamalai scheme, they would be placed in India only. Small generating stations in the Presidency would be replaced by distribution from large hydro-electric schemes.

Training of Apprentices

With a view to supplying the demand for electricians which has now grown in the Madras Presidency owing to the increasing number of electrical installations, Major Howard has prepared a scheme for training electrical apprentices which may be adopted by the more important electricity corporations. Under his scheme, two classes of apprentices are to be trained, namely (1) young men trained in engineering colleges and technical institutions who require an all-round practical training to qualify them for junior engineering posts. The training in their case would last for a period of one year. These will form the nucleus of trained engineers from whom electricity corporations will draw their junior staff. (2) The other apprentices would be lads with a certain amount of general education who wish to learn some specific trade and qualify themselves as skilled artisans. The training would cover a period of three years.

Economic Conditions in Newfoundland

MR. H. F. GURNEY, H.M. Trade Commissioner in Newfoundland and the Maritime Provinces of Canada, deals with economic conditions in Newfoundland and its Dependency, Labrador, in a report recently published by the Stationery Office for the Department of Overseas Trade (2s. net). Introductory remarks which preface the report show that Newfoundland has an area of 42,730 square miles with a population, at December 31st last, of 271,865, and Labrador an area of 120,000 square miles and a population of 4,203. Some useful information for commercial visitors is also given in the report.

Mr. Gurney says that during the past two years Newfoundland, in common with other countries, has suffered from business depression, although owing to the lack of statistical data it is not possible to draw well-defined conclusions as to how far the country has been affected.

As regards import trade, Canadian and United States exporters dominate the market. In the year ended June 30th, 1930, the latest year for which statistics are available, the imports from Canada amounted to $12,992,600, those from the United States to $12,101,752, and those from the United Kingdom, $5,527,575. There is not a British preferential tariff in Newfoundland as there is in Canada. The report states that Newfoundland should offer an increasing market for United Kingdom goods, but in recent years the imports from the United Kingdom have remained fairly stationary, and during the last fiscal year decreased. There is no doubt that United Kingdom exporters could get more business.

Electrical Imports

The amount of business in electrical goods and apparatus is increasing and averaged over the past four years a value of $300,000. The United States received two-thirds of this; the Canadian share being about 15 per cent., while the United Kingdom only received about 2 per cent., if the imports for the year 1926-27 are omitted. The largest item is electric motors and electric lamps, which are supplied almost exclusively by the United States. The Westinghouse and General Electric Companies are represented in St. John's. One of the electrical companies in the island is controlled by the Montreal Light, Heat and Power Corporation, and the other is an independent concern, controlling the telephone system and certain power plants. It has standardised on the Stromberg-Carlsson telephone equipment.

Water Power Development

There is an abundance of water power advantageously situated at or near the seaboard, the principal developments being in connection with the paper industry at Grand Falls and Corner Brook. The total potential (developed and undeveloped water power) in h.p. is: 50 per cent. of the time, 300,000 h.p.; 90 per cent. of the time, 185,000 h.p. There are at present eight power developments, seven of which are hydro-electric with an aggregate installed plant capacity of 141,800 kW, and one steam plant with a capacity of 3,500 kW. The largest development is that of the International Power & Paper Co., which has an installed generator capacity of 112,000 kW.

The Telephone Service

The telephone service is centred in St. John's, and in the past ten years the construction of toll lines between the chief towns and the settlements of the Avalon peninsula has been undertaken. In St. John's there are 7,500 telephones and over 1,000 outside the city. During the past year a 500-line super-service board for the Bell Island exchange was put into service. Negotiations are proceeding between the Avalon Telephone Co. and the American Telephone and Telegraph Co., which are expected to lead to the establishment of a service between Newfoundland and the United States before the end of the year.

Published Specifications

Compiled expressly for this Journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specification will be printed and abridged, and all subsequent proceedings will be taken.

1930

9,740. "Electric or gas irons for use in laundry work, or other like purposes." S. H. Brittain (H. B. Koth). March 27th, 1930. (357,950.)

10,237. "Radio communication with very short waves." E. Gerhard. April 2nd, 1929. (358,064.)

10,485. "Control of dynamo-electric machines." British Thomson-Houston Co., Ltd., and F. P. Whitaker. April 2nd, 1930. (358,035.)

10,721. "Circuit breaker for electric currents, operating by suction and/or compression." C. V. Subira. April 10th, 1929. (358,067.)

11,133. "Electrical means for determining altitude from aircraft." British Thomson-Houston Co., Ltd. April 8th, 1929. (Addition to 349,426.) (358,123.)

12,541. "Illuminated signs or the like." H. W. Finley. April 23rd, 1930. (357,996.)

12,545. "Electric indicating systems." C. H. Smith and F. W. Meredith. April 23rd, 1930. (357,968.)

13,341. "Electric heating-elements." G. Bray & Co., Ltd., and E. L. Wiegand. April 30th, 1930. (Addition to 221,180.) (357,969.)

13,483. "Systems for controlling the sequential operation of dynamo-electric machines or the like." British Thomson-Houston Co., Ltd. May 1st, 1929. (358,069.)

13,763. "Electric relays." F. I. Ray and A. W. Biddlecombe. May 5th, 1930. (358,070.)

16,371. "Armature coils for dynamo-electric machines." J. F. Cullin. May 27th, 1930. (358,073.)

18,699. "Wave signalling systems." Standard Telephones & Cables, Ltd., and E. K. Sandeman. June 19th, 1930. (357,957.)

19,113. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd., C. Gillings, and F. T. Belas. June 23rd, 1930. (Cognate application 20,588/30.) (358,043.)

19,280. "Alternating current circuit-breakers." H. Pearce and Associated Electrical Industries, Ltd. June 24th, 1930. (357,973.)

19,472. "Electric time-interval testing-apparatus." Standard Telephones & Cables, Ltd., S. Chapman, and A. Brown. June 26th, 1930. (358,003.)

19,477. "Electric accumulator flash-lamps." A. H. Mackley. June 26th, 1930. (357,974.)

19,538. "Control of the load factor in electric current-supply systems to electric furnaces." Birmingham Electric Furnaces, Ltd., and A. G. Lobley. June 27th, 1930. (Patent of addition not granted.) (358,082.)

19,683. "Control of current variations in reactive electric circuits." S. A. Stevens and Westinghouse Brake & Saxby Signal Co., Ltd. June 28th, 1930. (358,083.)

19,786. "X-ray tubes." F. A. Lindeman. June 30th, 1930. (357,978.)

19,952. "Television methods and devices." L. M. J. Loiseau and Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz. July 1st, 1929. (358,087.)

20,089. "Systems of picture transmission." British Thomson-Houston Co., Ltd. July 9th, 1929. (358,050.)

20,094. "Electric power supply systems." General Electric Co., Ltd., and G. Ellis. July 2nd, 1930. (358,051.)

20,098. "Illuminated signs." R. M. Craig. July 2nd, 1930. (358,091.)

20,127. "High-frequency transformer." Hazeltine Corporation. Aug. 3rd, 1929. (358,054.)

20,137. "Electric glow-discharge devices." Electrical Research Products Inc. Oct. 23rd, 1929. (Addition to 19,359/30.) (358,060.)

20,221. "Photo-electric cells." Westinghouse Electric & Manufacturing Co. July 5th, 1929. (358,097.)

20,294. "Electrolytic condenser and its manufacture." E. Banning. Aug. 30th, 1929. (358,100.)

20,345. "Balanced protective relay circuit for electrical machine sets, more particularly for Ljungstrom sets." Siemens-Schuckertwerke Akt.-Ges. July 5th, 1929. (358,107.)

20,430. "Terminal and coupling devices for electric conductors." J. Stone & Co., Ltd., and A. E. Honey. July 5th, 1930. (358,111.)

20,431. "Train lighting, heating, and like installations." J. Stone & Co., Ltd., and A. E. Honey. July 5th, 1930. (358,112.)

20,664. "Thermionic amplifier." Hazeltine Corporation. Aug. 17th, 1929. (358,132.)

20,706. "Junction-box for electric conduits." S. D. White and M. Levenger. July 8th, 1930. (358,134.)

20,716. "Electric frequency-selective apparatus." G. Priechenfried and J. Robinson. July 8th, 1930. (358,137.)

20,725. "Direct current arc-welding apparatus." J. B. Hansell and Associated Electrical Industries, Ltd. July 8th, 1930. (358,133.)

20,946. "Ultra high-frequency electronic oscillators." H. E. Hollmann. July 10th, 1929. (358,145.)

21,073. "Fittings for electric plugs for floors, wainscots, walls and the like." S. D. White and M. Levenger. July 11th, 1930. (358,148.)

21,693. "Manufacture of contact bases for electric discharge tubes, lamps, and the like." Westinghouse Lamp Co. July 17th, 1929. (358,161.)

21,926. "Arcing earth-protective devices in high-tension power transmission systems." Siemens-Schuckertwerke Akt.-Ges. July 31st, 1929. (358,167.)

23,460. "Electric heating appliances." A. H. Barker. Aug. 5th, 1930. (358,182.)

23,664. "Colour television." Communication Patents Inc. May 8th, 1930. (358,183.)

23,691. "Electrical oscillation generators." British Thomson-Houston Co., Ltd. Aug. 28th, 1929. (358,185.)

23,836. "Electric cable joints." W. W. Triggs (Ohio Brass Co.). Aug. 8th, 1930. (358,188.)

23,988. "Electric cables." Callender's Cable and Construction Co., Ltd., P. V. Hunter, J. F. Watson, and L. G. Brazier. Aug. 11th, 1930. (Cognate applications 24,953/30, 25,491/30, 25,624/30, and 1,440/31.) (358,190.)

23,994. "Electrolysers." Dr. J. E. Neoggerath. Aug. 11th, 1930. (358,191.)

24,396. "Method of introducing mercury into discharge tubes." Allgemeine Elektricitäts-Ges. Aug. 21st, 1929. (358,200.)

24,398. "Arc-extinguishing devices for electric circuit interrupters." A. N. Haworth and Associated Electrical Industries, Ltd. Aug. 14th, 1930. (358,201.)

25,572. "Broadcast receiving apparatus." Kolster-Brandes, Ltd. (Kolster Radio Corporation). Aug. 27th, 1930. (358,213.)

25,862. "Arrangement for converting light variations into current or potential variations." Siemens and Halske Akt.-Ges. Aug. 30th, 1929. (358,214.)

26,590. "Electric motor control." British Thomson-Houston Co., Ltd. Sept. 6th, 1929. (358,221.)

26,808. "Submersible electric cable and method for making same." A. Arutunoff. Sept. 8th, 1930. (358,227.)

26,840. "Delayed-action electric switches." M. H. Rhodes, Inc. Sept. 6th, 1929. (358,223.)

27,741. "Electromagnetic clutches." H. Ast. Sept. 17th, 1930. (358,238.)

27,787. "Dynamo-electric machines." W. N. Kilner and Associated Electrical Industries, Ltd. Sept. 17th, 1930. (358,240.)

28,160. "Wire-wound rheostats, potentiometers, variable inductances, and the like." S. McClatchie. Sept. 20th, 1930. (358,252)

28,439 "Electrolyte containers for electrolytic condensers." Sparks-Withington Co. Jan. 14th, 1930. (358,256.)

28,913. "Frequency controlling and stabilising devices suitable for use in wireless signalling." Marconi's Wireless Telegraph Co., Ltd. Oct. 18th, 1929. (358,264.)

30,237. "Mine and like signalling apparatus." R. M. D. Button. Oct. 9th, 1930. (358,284.)

30,390. "Electrical insulation." British Thomson-Houston Co., Ltd. Oct. 11th, 1929. (358,285.)

30,628. "Insulating electrical conductors." British Thomson-Houston Co., Ltd. Oct. 11th, 1929. (358,290.)

30,844. "Electromagnetic step-by-step switches." Coventry Automatic Telephones, Ltd., and C. C. Puckette. Oct. 15th, 1930. (358,293.)

31,055. "Protective control of two or more inductively related electric circuits." British Thomson-Houston Co., Ltd. Oct. 18th, 1929. (358,299.)

32,357. "Aerials for wireless transmission and reception." L. C. Heath and H. C. Boisselier. Oct. 28th, 1930. (358,315.)

34,344. "Electric telemetering systems." British Thomson-Houston Co., Ltd. Nov. 16th, 1929. (358,333.)

34,995. "Directional aerial systems." Marconi's Wireless Telegraph Co., Ltd. Nov. 26th, 1929. (358,344.)

35,207. "Electric insulators or bushes." General Electric Co., Ltd., and J. Goodman. Dec. 1st, 1930. (358,354.)

35,267. "Lamps for vehicles." R. Bosch Akt.-Ges. Dec. 20th, 1929. (358,355.)

35,362. "Methods and devices for forming grids for accumulator plates by casting." Etablissements G. Briere. Dec. 2nd, 1929. (358,357.)

37,498. "Electrically operated refrigerating device." W. W. Triggs (Williams Oil-O-Matic Heating Corporation). Dec. 12th, 1930. (358,367.)

37,571. "Kerr and similar electro-optical cells." Marconi's Wireless Telegraph Co., Ltd. Dec. 12th, 1929. (358,368.)

38,086. "Aerials." Telefunken Ges. für Drahtlose Telegraphie. Feb. 6th, 1930. (358,372.)

38,138. "High-tension cables." Deutsche Kabelwerke Akt.-Ges. Jan. 22nd, 1930. (358,373.)

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1,381. "Automatic circuit-breakers for electrically heated domestic utensils." Credenda Conduits Co., Ltd., and P. W. Davis. Jan. 15th, 1931. (358,389.)

3,057. "Electric plug switches." Ludenscheider Metal-Werke Akt.-Ges. Vorm J. Fischer and Basse. May 12th, 1930. (358,394.)

5,044. "Electric lamps." General Electric Co., Ltd. May 16th, 1930. (358,399.)

5,638. "Electric motors." British Thomson-Houston Co., Ltd. Feb. 21st, 1930. (358,402.)

5,900. "Control of electrically propelled vehicles." Sachsenwerk Licht-und Kraft Akt.-Ges. Nov. 24th, 1930. (358,405.)

6,178. "Submarine cables with pressure protection." Siemens Schuckertwerke Akt.-Ges. March 10th, 1930. (358,407.)

18,283. "Electrical glow-discharge lamps." Electrical Research Products, Inc. Oct. 23rd, 1929. (Divided application on 358,060.) (358,061.)

22,379. "Micro-telephone." W. W. Triggs (Telephon und Telegraphenfabriks Akt.-Ges. Kapsch und Sohne). July 14th, 1930. (Divided application on 21,326/30.) (358,418.)

Trade Mark Applications

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from October 31st:—

Macom. No. 524,114. Class 6. Electric motors for gramophones. No. 524,115. Class 8. Sound-reproducing and recording apparatus, radio-telephonic apparatus, etc.—Paul Spiegel, trading as Sommer & Steiner, Leipzig. (British representatives: P. J. Cleveland & Co., 29, Southampton Buildings, Chancery Lane, W.C.)

Trigomat (lettering and design). No. 525,973. Class 8. Sound-reproducing instruments and parts thereof.—Cecil Sales Co., Ltd., 60, Strand, W.C.2.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Abbot's Langley (HERTS.).—Factory extensions for Wander, Ltd., King's Langley.

Ambergate (DERBY).—Re-erection of wood turning mill, electrically equipped, for W. Holden & Sons, Belper (£5,000).

Barnsley.—Houses (36), Well Lane, for the B.C.; H. Taylor, architect, Church Street. Alterations to business premises, Doncaster Road; J. R. Wilkinson, architect, Regent Street.

Batley.—Alterations to the tuberculosis dispensary; West Riding Architect, County Hall, Wakefield.

Beverley.—Extension of the Cottage Hospital; Whiteing and Reynolds, architects, 3, Ladygate.

Bexhill-on-Sea.—Development of Broadoak housing estate; borough engineer. Alteration to the Metropolitan Convalescent Institution, Cooden Sea Road; Rowland Plumber & Partners, Cooden Sea Road.

Birmingham.—Dairy, Vine Lane, Halesowen, for the Halesowen and Hesbury Co-operative Society, Ltd.; T. Stanley Beach, architect, New Road, Halesowen.

Blackpool.—Hotel, Queen's Drive, for T. H. Greenwood; R. Anderton, architect, Kenilworth Gardens. Shops and café, Station Road, for J. R. Quayle, Singleton; Halstead Best, architect, Leeds Buildings, 20, Clifton Street.

Bournemouth.—Business offices and flats, Richmond Hill; R. F. Seward. Cinema, Queensland Road; Hants. Land Society, Ltd. Alterations and additions, Gordon Hotel, Southborne Overcliff Drive; W. G. Gubbins. Alterations and additions, 382-6, Holdenhurst Road; Co-operative Society, Ltd. Alterations and additions, Primitive Methodist Church, Curzon Road; trustees. Theatre, Westover Road; Bournemouth and Southern Theatres, Ltd. Extensions to Central fire station (£11,222); Hawkins Bros. Extensions to 72, Poole Road; Boots (Southern), Ltd.

Brigg.—Sewage works (£11,000); surveyor to the R.D.C.

Cambridge.—X-ray department, Addenbrooke's Hospital; Pick, Everard, Keay & Gimson, architects, 6, Millstone Lane, Leicester.

Castleford.—Post Office; H.M. Office of Works (contracts branch), King Charles Street, London, S.W.1.

Colwyn Bay.—Elementary school, Brackley Avenue, for the Rev. C. McManus, Joseph's Conway Road; Hallwoods, Ltd., builders, Bennett Street, Hyde.

Coulsdon.—Premises for F. W. Woolworths, Ltd.; Chipstead Valley Road; Edgar R. Taylor.

Croydon.—Houses (80), Ham Farm estate; borough engineer. Church and vicarage, Bingham Road and Sefton Road; W. Downs, Ltd., 12, Hampton Street, S.E. Alterations and additions, 9-11, London Road; H. F. Bailey, 74, Queen Victoria Street, E.C.4.

Doncaster.—Premises for J. May & Son; Allen & Hickson, architects, Hallgate.

Dorchester.—Houses (20), Victoria estate; borough engineer.

Dundee.—New buildings (electric lighting) at Maryfield Hospital for the Corporation Public Health Department (£5,800); city architect.

Dunston-on-Tyne.—Building for the Co-operative Wholesale Society; C.W.S., architects' department, Westmorland Road, Newcastle.

Eastbourne.—Premises, Pevensey Road; Bobby & Co.

Edinburgh.—Houses for the Corporation, Broughton Road; city architect.

Evesham (WORCS.).—Houses (80), Rynal site, for the T.C.; borough surveyor.

Gillingham (KENT).—Houses (26), Chada Avenue, for C. J. Varrall.

Glasgow.—Houses (132), Garngad; town clerk, City Chambers.

Gloucester.—School for the city E.C.; Mr. Trew, architect.

Gravesend.—Houses (184), Denton estate; borough architect.

Herne Bay.—Houses (31), Grafton Rise; U.D.C. surveyor.

Hitchin (HERTS.).—Houses (140) and flats (20), Walsworth, for the U.D.C.; A. T. Blood, surveyor.

Hornchurch.—Church; Vicar of Holy Cross.

Hull.—Extensions to Hall Road School (£47,000); city engineer.

Kettering.—Post office; H.M. Office of Works (contracts branch), King Charles Street, London, S.W.

Leeds.—Church, Airedale, for the C.O.E. authorities; Sir C. Nicolson, architect, Lincoln's Inn, London, W.C.

Leicester.—Cinema (1,000 seats), Clarendon Park; W. H. and H. G. Riley, architects, 25, Horsefair Street. Extensions to City General Hospital (£9,840); A. F. Duke, architect.

London.—(EAST HAM).—Church; Vicar of St. Paul's Church. (POPLAR).—Flats (48), cottages (2), and shops (20), Cubitt Town; borough engineer. (ST. PANCRAS).—Improvements to premises, Tottenham Court Road (£125,000); Maple & Co., Ltd. Shops, colonnade, etc., Hampstead Road; London Temperance Hospital Governor. (STOKE NEWINGTON).—Additions, Finsbury Park Hotel, Green Lanes; S. A. S. Yeo.

Lowestoft.—Shops, Oxford Road; Haste & Knights.

Manchester.—Cinema (1,000 seats), Moss Side; Drury & Gomersall, architects. Imperial Chambers, Oxford Road. Houses (62), Stokes Street; city architect. Development of 27-acre estate off Wilmslow Road; J. T. Scott, builder. Extensions to Didsbury Boys' Central School; city architect.

Moffat.—Housing scheme for the T.C. (£5,100); burgh surveyor.

Newcastle-on-Tyne.—Shops, New Bridge Street; H. Waller, builder, Waller Street. Additions to Canning Street schools for the E.C. (£9,167); G. H. Mauchlen, builder, Barrick Street. Additions to the Walkergate schools for the E.C. (£13,000); S. F. Davidson, builder, Ridley Villas.

Newcastle-under-Lyme.—Houses (33), Polefield estate, for the Corporation; J. Griffiths, Town Clerk's Office.

Newmilns (AYRSHIRE).—Offices for the Burgh Council (£2,500); burgh surveyor.

Oldham.—Housing scheme, Deaker; borough surveyor.

Portsmouth.—Houses (30), Hawthorn Cross, Cosham; G. & W. Mitchell. Houses (20), Elmwood Road, Hilsea; R. J. Winnicott. Houses (20), Kirby Road; McCarthy Bros. Houses (18), Stanley Avenue, Copnor; V. Dye.

Purley.—Cinema and café, Brighton Road; R. Cromie, architect.

Reigate.—Houses (24), Horley, for the R.D.C.; Walter Cottage, Ltd., builders.

Sanderstead (SURREY).—Development of Rectory estate; H. Holliday Williams & Partners.

Sea Houses (NORTHUMBERLAND).—Development scheme for the Fisheries Committee (£25,000); W. W. Tasker, county architect, 17, Claremount Place, Newcastle.

Seaton Delaval.—Houses (48); surveyor to the U.D.C., Council Offices.

Selsdon (SURREY).—Three shops, Selsdon Road; R. K. Kruse, Oxshott Road, Leatherhead.

Sheffield.—Church, Low Shiregreen (£7,500); secretary, Bishop of Sheffield's Appeal Fund. Shop, Manor estate; Brightside and Carbrook Co-operative Society. Elementary school, Sycamore House Road; city architect.

Shipley.—Cinema and shops for the Shipley Picture House, Ltd.; H. Chippendale, builder, Bar Grange Avenue.

Shrewsbury (SALOP).—Houses (100), Judith Butts, for the T.C.; borough surveyor.

Smethwick.—Extensions to Tube Mills, Rolfe Street; George Burn, Ltd.

Sowerby Bridge.—Alterations to the tuberculosis dispensary (electric lighting); West Riding architect, County Hall, Wakefield.

Staffordshire.—Extensions, Cotton R.C. College (£20,000); George Drysdale, architect, 17, Buckingham Street, London, W.C.

Stirling.—Housing scheme for the T.C.; burgh surveyor. Reconstruction of business stores, Dumbarton Road and Port Street, for Graham & Morton, Ltd., King Street.

Stoke-on-Trent.—Houses (62), Meir estate (£23,274); Ball & Robinson.

Stourbridge.—Old Edwardian Club, with electrical and heating work; T. W. Edwards & Sons, builders, Audnam.

Sunderland.—Conversion of Clifton Villa School into training college (£17,000), and Messrs. Hutchinson's premises into a senior school; also remodelling of High Southwick School for the E.C. (£7,800); O. T. Mark, architect, Town Hall.

Swansea.—Houses (100), Townhill estate (£32,993); Charles Samson.

Tadcaster.—Houses (24), Kippax, for the R.D.C.; T. Scott, surveyor, R.D.C. Offices.

Thornton Heath.—Houses (95), Stanford estate; Truett & Steel, Ltd., High Street.

Tynemouth.—Development of Balkwell estate; Woodall & Shepherd.

West Riding.—School, Hoyland, for County E.C.; E. Brown & Son, builders, Wath-on-Dearne.

Whitstable.—Houses (28), Westmeads site, for the U.D.C., B. R. Rigden, builder.

Windsor.—Coach station and garage, for East Surrey Traction Co., Ltd.

Worcester.—Senior school (£28,800), for the city E.C.; director of education.

Worcestershire.—Extensions, Kidderminster institution and laundry (£3,100), for the County Public Assistance Committee; clerk, Worcester.

Woodingdean (SUSSEX).—Church, King Charles Avenue; S. Etheridge.

York.—R.C. schools, Tang Hall estate (£7,300); J. T. Wailes, builder.

Industrial Lighting

The third lecture of the Faraday Illumination Design Course was given last Monday evening by Mr. S. Anderson, B.Sc. It includes the following information:—

Home Office reports indicate a considerably higher accident rate in the winter; thus, in the cotton industry, the rate is 92% higher than in the summer, for which the poorer light is chiefly responsible. The cost of compensation for accidents in 1928 was £6,000,000, plus indirect costs such as loss of time. Good lighting also secures more accurate workmanship, increased production, improved working conditions (due to absence of eye strain), promoted cleanliness, permitted more efficient supervision. In the majority of factories the lighting installations have some of the following faults: (1) improper shading, causing glare; (2) too low a value for the kind of work; and (3) variation of intensity, accompanied by deep shadows. The standard dispersive reflection conforms with B.E.S.A. specification No. 232, which specifies a minimum luminous efficiency of 60 per cent. With enclosed, or focusing units, the use of clear gas-filled lamps is recommended, but, with the standard dispersive reflector and most other open units, pearl or opal lamps give the best diffusion of light.

Where units can be mounted at a height of from 10 to 12 ft. general lighting with a symmetrical lay-out of points is satisfactory, with the addition of local units where the fine nature of the work requires it, deep reflectors being employed. The design of a lighting scheme is no longer a matter of guesswork and provides manufacturing conditions quite comparable to those of good daylight.